

Queensland Fruit Flies (*Trypetidae*), Series 1.

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PLATES XX-XXIV.

(Read before the Royal Society of Queensland, 27th September, 1926.)

INTRODUCTORY.

AUSTRALIAN AND QUEENSLAND FRUIT FLIES.

The already known Queensland Trypaneidæ (fruit flies) comprise the following species:—

1. *Chæodacus Tryoni*, Froggatt, 1897 (*Tephritis*) = *Tephritis* sp., Tryon, 1889.
2. *Chæodacus cucumis*, French, 1907 (*C. Tryoni* var. *cucumis*, French).
3. *Ceratitis capitata*, Wiedemann, 1824 (*Halterophora*)*.
4. *Rioxa musæ*, Froggatt, 1899 (*Trypeta*).

In addition, the following fruit flies have been accorded an habitat in Australia, outside the limits of Queensland, by W. W. Froggatt:—

5. *Chæodacus æqualis*, Coquillet, 1908 (*Dacus*).
6. *Chæodacus Froggatti*, Bezzi = *Dacus zonatus*, Frogg, 1910, nec *zonatus*, Saunders, 1841 (*Dasyneura*).
7. *Ceratitis loranthi*, Frogg. 1911.
8. *Lenophila (Ceratitis) dentipes*, Guérin, 1843 (*Ceratitis*).
9. *Rioxa bicolor*, Macq., 1855 (*Urophora*).

Further there is the Northern Territory fruit fly:—

10. *Rioxa termitoxena*, Bezzi, 1919.

Moreover, M. Bezzi includes in his "Critical Review of the Oriental and Australian Trypaneids (Fruit Flies) hitherto Described" (1913, pp. 65-84), amongst the 334 nominal species from these regions, and taking into consideration the foregoing, a total of 24 different species as credited by their respective authors to Australia, *i.e.*, 14 additional ones.

Of these fourteen fruit fly species, five have definitely been allotted to Sydney (Port Jackson) as the place where originally obtained. These are as follows:—

11. *Bactrocera longicornis*, Guérin, 1832.
12. *Tephritis pelia*, Schiner, 1868.
13. *Tephritis undecemguttata*, Thomson, 1858.
14. *Edaspis escheri*, Bezzi, 1910.
15. *Rioxa pornia*, Walker, 1849 (*Trypeta*).

* The Queensland occurrence of this fruit fly—commonly found there in imported fruit—is given on the authority of W. W. Froggatt (1909, p. 104).

The further nine distinct Trypetids, that with these five constitute the foregoing number, have merely "New Holland" assigned to them as the place of their occurrence.

As regards the five New South Wales insects above mentioned, we have no evidence of their having been found at Sydney, nor indeed elsewhere in Australia, since the dates when they were described and had this place accorded to them as a type locality. Moreover, apparently no authentically named specimens are discoverable, with one exception only—the *Ædaspis*, whereby they can be recognised.

The published descriptions of these four "New Holland" and "Port Jackson" fruit flies are for the most part of such a nature as not to constitute an adequate account or definition in the case of any one of them, even when the figures illustrating certain of them are taken into consideration. The illustrations, in fact, lack essential details, and the descriptions alluded to are either too brief or do not conform to any recognised system in specifying what may be regarded as characteristics.

There are still other flies of alleged Australian origin, that are enumerated amongst the 334 of Bezzi's "Critical Review" and that, as indicated by him, although placed by the respective authors of the different species in the family Trypaneidæ are now known to be members of species quite distinct from it, a remark that applies to Diptera properly belonging to the Ortalidæ, such as *Dacus aequalis*, Walker, or to other groups. These are, of course, not fruit flies proper: a remark true, too, of the "Black Fruit Fly" (Tryon, 1889, p. 75), one of Queensland's fruit-loving Anthomyidæ.

It will thus serve no useful purpose to treat of them. This remark also applies to the Port Jackson and New Holland fruit flies, seen only in the light of inadequate descriptions as already pointed out.

FRUIT FLY FEATURES AND CONDITIONS.

In estimating the value to be attached to different features presented by fruit flies occurring in collections, the following facts need be taken into consideration. Insects that have been reared will, unless they have been fed suitably during a period of several days prior to their being killed, have their abdomens collapsed and bent under; or, if not, narrowed and lengthened with segments 1 and 2 unduly extended; and when killed quite early, especially prior to being fed, may have their general colour, including wing-markings, of a lighter hue than is normal. Again, the pale calli spots or bands, that are almost invariably sulphur-yellow in life, will by mere lapse of time be rendered quite inconspicuous.

With regard to structural characters to be relied upon in distinguishing the several species, especially those of *Chatodacus*, the characteristics yielded by the male and female organs, especially those of the forceps in the former sex, have not been here inquired into: notwithstanding the value F. Silvestri has derived from such an investigation (*vide* "Report

of an Expedition to Africa in Search of Natural Enemies of Fruit Flies" (Trypaneidæ) (p. 92-95 and Pl. VIII.) would appear to suggest their importance in separating allied species, or species that, on other grounds, may be regarded as varieties of single species.

In the nomenclature relating to the features embodied in the several descriptions, that detailed by M. Bezzi and adopted by him in his "Indian Trypaneids (Fruit Flies) in the collection of the Indian Museum" 1923, and amended and further adopted by this great dipterologist in his "Notes on the Ethiopian Fruit Flies of the Family Trypaneidæ other than *Dacus sen. lat.*" 1918, has been followed, in accordance with this scheme, also illustrated and carried out by Professor Shiraki in his Chinese-Japanese Memoir.—"*Mikau Shogitsugo ni Kwansuru*" (Citrus Fruit Fly Investigation), Formosa, 1921.

The biological features of the several fruit flies treated of, and the nature and extent of the injuries for which they are responsible, as well as all descriptive details regarding their eggs, maggots or pupæ, have been omitted, notwithstanding their importance, since they have not been regarded as coming within the scope of this Memoir, which is technically systematic and intended as an authoritative account of the outward characteristics by which they may be severally distinguished.

Following the course adopted in enumerating the recorded fruit flies of Queensland and of Australia (*vide* p. 176), dipterous flies, whose maggots may occur in the tissues of ripe or even ripening fruit, such as those included in the families Ortalidæ, Anthomyidæ, Lonchæidæ, and Stratiomyidæ, have *not* been subjects of description, since not, perhaps, presenting features in their life economies of any significance.

Where indigenous, plants are named as furnishing fruits wherein the several species of Trypetidæ whilst in the maggot condition dwell, and on whose tissues they subsist, the State Botanist, Mr. C. T. White, F.L.S., has been applied to for their nomenclature, except in cases in which their identification was quite obvious.

Previous Literature.—Up to the present date there has been no systematic account of the species of Queensland fruit flies (Trypetidæ), notwithstanding these are evidently far more numerous than would appear from the present account denominated Series 1. Other Australian entomologists, notably W. W. Froggatt, late Government Entomologist of New South Wales, have, however, incidentally treated of some of our species as denizens of other Australian States. As an exception, however, may be mentioned the fact that Hubert Jarvis, Entomologist, Department of Agriculture, Stanthorpe District, whilst a member of the present writer's staff, wrote a popular descriptive article:—"Fruit Flies of the Granite Belt" (Stanthorpe area), relating to the following local species:—"The Queensland Fruit" (*C. Tryoni*, Frogg.), "The Solanum Fly" (*O. Solani*, Tryon mss. = *C. dorsalis*, Hend.), "The Jarvis Fruit Fly" (*C. Jarvisi*, Tryon mss.), and the "Stanthorpe Spotted Fruit Fly"

(*Rioxa Jarvisi*, Tryon mss.). This was illustrated by coloured drawings. After office revision its text was set up in type about two years since, but, owing to technical difficulties in reproducing the figures in colour, has never yet been printed. In fact, the accompanying plates alluded to are not available at this date (1.7.26), although now complete. This fact constrained the writer to associate H. Jarvis with the latter as joint author of the present memoir. This course, however, our colleague did not favour, but has permitted us to dedicate two of the fruit flies, of which he treated, to him.

Obligations.—The writer, in recognising his obligations, has to refer to Mr. E. Graham, Under Secretary, Department of Agriculture and Stock, for permission to prepare and submit this account of Queensland fruit flies, and for instructing the several field officers on the staff of the Director of Fruit Culture to co-operate by collecting and forwarding fruits of native trees, and to Messrs. S. E. Stephens (Gympie) and A. Wooller (Bowen) for the manner in which they have complied with this order. Similarly, to the Provisional Forestry Board (E. H. F. Swain, Chairman) for so instructing, in like manner, the Deputy Foresters in the several districts of Queensland; and to the very material assistance accordingly rendered by Mr. F. C. Epps, the officer stationed in the Gympie forest district, and to Messrs. E. F. Fitzpatrick, R. W. Sweetenman, and F. Reynolds, members of his staff; also to Mr. J. R. Dawson of the Frazer Island district and his staff; similarly to Mr. T. B. Bourke, Rockhampton forest district, and his coadjutor in the work, Mr. E. J. Richter, Byfield, and again to Mr. J. C. Tardent, Benarkin forest district. The writer further is especially indebted to the following:—Messrs. Heber Longman, F.L.S., Director, Queensland Museum, for loan of literature; H. Jarvis, Entomologist, Stanthorpe, for several fruit flies, including two new species brought to light by his own discoveries; Dr. T. L. Baneroft, Eidsvold, for numerous contributions, including, amongst other distinct species, examples of the northern Banana fruit fly from the native *Musa* (banana), as well as from the cultivated *Musa Cavendishi* (cultivated banana), also for examples of *Chatodacus Tryoni* exhibiting the range in dietary—as a maggot—discovered by this notorious insect; and E. H. Rainford similarly for Bowen species. Further, to J. H. Simmonds and W. A. T. Summerville, both of his staff, the former for contributing fruit-fly-infested native fruits, the latter for bringing to maturity in the insectary the fruit flies yielded by the same as received from different localities. Again, to the State Botanist, C. T. White, and his assistant, W. D. Francis, thanks are due for plant identifications, and gratefulness is especially entertained towards the artist, I. W. Helmsing, for the skilful delineation of the several fruit fly species shown in the plates with which this memoir is illustrated.

TYPES.

The types of all species of Trypetidæ herein regarded as new are being deposited in the Queensland Museum, and are now registered under the accession numbers assigned by that institution.

QUEENSLAND FRUIT FLIES.

TABULATED ARRANGEMENT.

CHAETODACUS SENS. LAT.

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| 1. General colour yellow, yellow-brown, or red-brown, length exceeding 4 mm. | 2. |
| General colour black, length not exceeding 4 mm. | <i>C. niger</i> sp. nov. |
| 2. Wing with a single dark band involving hind cross vein widely, and attain-
ing costal band or not | 13. |
| Without cross band | 3. |
| 3. Markings of mesonotum (if any) brown | 4. |
| Markings of mesonotum black and conspicuous | 9. |
| 4. Scutellum with apical pair of bristles only | 5. |
| Scutellum with basal and apical pairs | 12. |
| 5. Costal cells of wings coloured | 6. |
| Costal cells of wings uncoloured (<i>vid.</i> also 9.) | 8. |
| 6. Costal cells of wings pale horn-yellow | <i>C. tryoni</i> Frogg. and its varieties. |
| Costal cells of wings fuscous | 7. |
| 7. Costal marginal band filling marginal and sub-marginal cells | <i>C. bryoniæ</i> sp. nov. |
| Costal marginal band filling marginal, submarginal and 1st posterior cells | <i>C. æqualis</i> , Coquillet. |
| 8. (a) A noto-pleural pale yellow stripe (uniting humeral and noto-pleural
calli) and (b) anterior supra-alar bristle absent | <i>C. Jarvisi</i> sp. nov. |
| (a) absent. (b) present | <i>C. Fagræa</i> , sp. nov. |
| 9. Black area of mesonotum confined to lateral (dorso-lateral) blotches (3);
facial spots pointed anteriorly | <i>C. Halfordiae</i> , sp. nov. |
| Both otherwise | 10. |
| 10. Black area of mesonotum, a mesial narrow lanceolate stripe, with apex
at fore and base at hind border | <i>C. dorsalis</i> , Hendel (and varieties). |
| Black area of mesonotum, not lanceolate, and occupying almost entire
surface of notum, with lateral præsutural extensions (<i>vid.</i> <i>C. Bryoniæ</i>
sp. nov. | 11. |
| 11. Abdomen entirely reddish-yellow, scutellum with broad fuscous band
between origins of apical bristles | <i>C. Bancrofti</i> sp. nov. |
| Abdomen the same, scutellum wanting transverse band | <i>C. Musæ</i> , sp. nov. |
| 12. Meso-notal pale yellow stripe from suture to 2/3 ns. towards scutellum;
infero-orbital bristles 3. 5th longitudinal distinctly fuscous at end.
No spot on 5th abdominal segment | <i>Dacus cucumis</i> Fr. |
| Meso-notal pale yellow stripe from level of humeral calli almost to
scutellum; infero-orbitals 2; 5th longitudinal vein not infuscated
at end; spot on 5th abdominal segment above distinct | <i>Dacus signatifer</i> , sp. nov. |
| 13. Dark band very conspicuous narrowing from a wide base to costal border.
No oval fuscous spot at apex of wing | <i>Bactrocera pulcher</i> sp. nov. |
| Dark band less conspicuous, not attaining costal band, and this ending in a
large oval spot at end of 3rd longitudinal vein | <i>Bactrocera caudatus</i> , Fabr. |

RIOXA.

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| 1. Mesonotum white with longitudinal black stripes, abdomen upper surface
with segments 1-4 white-banded transversely: pale or brownish
yellow | <i>R. araucariæ</i> sp. nov. |
| Mesonotum and abdomen otherwise marked | 2. |
| 2. Abdomen above parti-coloured, black with segments 1, 2, and middle of 3
and venter white; wings* with 2 discoidal spots | <i>R. Musæ</i> (Frogg.) Bezzi. |
| Abdomen above black, 3-white banded with segments 1-3 only whitish
beneath; wings with 3 discoidal spots | <i>R. jarvisi</i> , sp. nov. |

* The pattern of wings in other respects widely different in these two species, and that of neither manifests any correspondence with the wing pattern of *R. araucariæ* sp. nov.

Gen. CHÆTODACUS Bezzi.

CHÆTODACUS* TRYONI (Froggatt). (Pl. xx., Fig. 1 male, Fig. 2 female.)

THE QUEENSLAND FRUIT FLY.

Tephritis sp.—Tryon, H., "Report on Insect and Fungus Pests" (1) p. 54-60, Brisbane, 1889.

Tephritis Tryoni.—Froggatt, W. W., "Agricultural Gazette of New South Wales," viii., 1897, p. 410, pl. figs. 1-8.

Tephritis Tryoni.—Froggatt, W. W., *op. cit.* x. (1899), p. 498 (without description).

Dacus Tryoni.—Froggatt, W. W., "A General Account of the Flies belonging to the Family Trypetidæ," Sydney, 1909, p. 11-23, pl. 1, and pl. iv. 1 (wing), *s.v.* "The Queensland Fruit Fly." [Also in several reprints of this.]

Male and Female. Measurements—

Male.—Length of body 7 mm., of wings 5.6 mm.; *female*.—Length of body 7 mm., of ovipositor .75 mm., of wing 6 mm.

Head.—Pale brownish-horn colour, occiput pale yellowish-brown, post orbital portion of paler hue; vertex-ocellar spot black with a small brown blotch on each side (this often absent in the species); frontal spots more or less distinct especially superior one: face pale yellow, lighter anteriorly its fore-border little raised—almost level in front of depression, spots circular distinct remote from fore-border, cheeks greyish-white; antennæ-joints 1 and 2 subequal, orange, joint 3 with fuscous upper outer surface tip darker; palps orange, proboscis and tongue lighter yellow; cephalic bristles as follows:—vt. outer brown, inner dark-piceous; s.or. 1, i.or. 2, all black; gular dark; ocp. black—usually 7.

Mesonotum.—Yellowish-red with paler yellow appressed pubescence, white erect pubescence on border in front of humeral calli and mesonatal stripe, central-dorsum occupied with a broad greyish fascia, lateral dorsal area reddish-brown and within this on each side a lateral dark-brown longitudinal band arched from inner side of humeral callus nearly to hind border following the curved upper margin of supra-alar stripe along its full extent, below it the lower side also red: scutellum yellow with apical pair alone of dark long bristles; meso-phragma broadly piceous at sides, this piceous colour extending downwards behind the hypo-pleural calli, central area pale brown anteriorly, then suddenly narrowing posteriorly to a slender mesial band: anterior half of meso-

* The definitions of *Dacus sens. lat.*, *Dacus sens. strict.*, *Chatodacus* and *Bactrocera* that are detailed by M. Bezzi ("On the Fruit Flies of the genus *Dacus* (*s. l.*) occurring in India, Burma, and Ceylon," 1914, and accepted by Hendel in his "Die Gattungen der Bohr Fliegen: analytischen übersicht aller bisher bekannten gattungen der Tephritinæ) (Wien entom. Zeitung, xxxiii., ap. 1914, pp. 73-98) have been followed throughout this paper.

pleuron, anterior sterno-pleuron and pectus piceous: calli and bands and spots bright lemon yellow as follows:—humeral callus, noto-pleural, meso-pleural, sterno-pleural, hypo-pleural (2) and supra-alar stripe: thoracic bristles (Chatotaxy) as follows:—sa. subequal, n.pl. 2, pr. sc. 2, a.sa. 1, and p.sa. 2 alike brown, a.sa. decumbent, m.pl. and pt.pl. both black.

Abdomen.—Of a general brown colour clothed above with hoary adpressed pubescence, segment 1 (basal segment) brown and occupied with little low excrescences, segment 2—anterior part whitish posterior flavous or pale-yellow without definite intervening line—the boundary being sigmoid so that in the middle the whitish area of the segment occupies nearly half the length of this segment whilst it narrows and vanishes on each side. Segments 3 to 5 brown, deeper tinted at the sides and suffused with yellow in centre, a dark grey mesial longitudinal score—seen by oblique light especially—traversing them, oval area on each side of fifth large—involving nearly entire length and width of segment, its surface occupied sparsely by a few small granules: Ovipositor in female, basal portion (segment 7) elongate triangular lowly conex both above and below. Male with pecten of black bristles on the hind border of 3rd segment on each side above.

Wings.—The veins dull yellow except when traversing or bounding coloured areas when they are fuscous: marginal cell very narrow the 1st and 2nd longitudinal bounding it coalescing just at small cross vein, the second basal cell somewhat wider beyond $\frac{2}{3}$ length: the costal-band—commencing at wing base—is dull pale yellow where it involves the costal cells, pale fuliginous where the stigma, and darker fuliginous beyond being narrowest where it occupies the marginal cell, the wider portion following the wing margin to nearly half way between 3rd and 4th longitudinal veins, ending abruptly, *i.e.*, without either enlarging or becoming attenuated, the narrow portion of the first basal in front of the 2nd basal cell is also fuscous, the anal stripe comprises a band through the anal cell continued in its extension, and a broader one along the inner side of the 3rd posterior cell contiguous to the anal cross vein and the extension of the cell that it bounds. This, in the male, is continued in an indefinite dark patch in the outer angle of the axillary cell. In this sex, moreover, the supernumerary cell has only a small development.

Legs.—Yellow with the tibiæ and tarsi suffused with brown, the hindmost ones being fuscous except on their inner surfaces, the ungues and spinelets at end of tarsal joints black: two longitudinal parallel rows of thin black spines occur on the outer surfaces of the front femora, one extending along its length, the other shorter; spine at end of intermediate tarsi black.

Types.—Reg. No. Q.M.D. 3119, Plesiotypes—male and female.

Note 1.—The colouration of the costal cells of the wings—translucent but yellow, and the constant absence of any trace of black on the mesonotum (“thorax”) slight traces only being found in varietal forms, and the absence of a mesial longitudinal noto-pleural stripe are characteristic.

Note 2.—The original description of this fruit fly was published by the writer in 1889. (1) "Inquiry into Diseases affecting the Fruit Trees and other Economic Plants in the Toowoomba District," Brisbane, by authority, 1889 (Parl. Paper); *s.v.* "The Fruit Maggot, Fruit Fly—*Diptera* Gen. *Tephritis*," *op. cit.* 26-35, *cf.* pp. 27-28; and (2) "Insect and Fungus Pests," Brisbane, 1889, pp. 57-59 (Reprint of (1)). This was fully comprehensive, and, although couched in technical terms other than those now used, adequately characterises the species.

Eight years subsequent to this, the insect having then (fruit season 1896-7) shown unusual prevalence in New South Wales, W. W. Froggatt, whilst referring to the foregoing, gave a general account of the insect ("The Fruit Maggot Fly *Tephritis tryoni*, n.sp." "Agricultural Gazette N.S. Wales," viii., p. 410-12, Pl. fig. 18). This is evidently based on examples of a fruit fly bred in his office from fruit (? apples—H.T.) received from Tenterfield, N.S.W., in February, 1897 (*cf. op. cit.*, p. 410), and notwithstanding the meagreness of his description, the excellent plate wherewith he illustrates his account of it renders it evident that he is dealing with the one now under consideration. The plate, moreover, bears the legend—"Queensland Fruit Fly"—*Tephritis Tryoni*, n.sp., and in a footnote its author informs us that he has so named it "as Mr. Tryon informs him it is an undetermined species," &c. Later, W. W. Froggatt, in his "Notes on Fruit-Maggot Flies, with Descriptions of New Species" ("Agr. Gaz. N.S.W.," x. (1899), pp. 497-504) and under "Queensland Fruit-Maggot Fly—*Tephritis Tryoni*, Frogg." (*op. cit.*, p. 494) again deals with this trypetid, remarking:—"This species has been well described by Tryon" (referring to our 1889 account of it). However, he informs us:—"The only specimens of this species that have been bred in our office are those (from maggots in) overripe or decaying bananas and other Northern fruits that have been condemned at our wharves" (*op. cit.*, p. 498), and although this statement might be regarded as throwing doubt on the identity of the insect, with which he is dealing, with his *T. Tryoni*, the plate accompanying this paper is conclusive to the contrary on this point.

Froggatt, after an interval of ten years, again treats of the "Tryon Fruit Fly" in his valuable "Report on Parasitic and Injurious Insects," 1907-8, Pt. III., "Fruit Flies," "The Queensland Fruit Fly—*Dacus Tryoni*, Froggatt. This embodies a further short description, but whilst this does not allude to the wing-features, the figure that he gives of a wing (Pl. 1, fig. 1) renders it additionally evident that the species that he is dealing with is the one concerning which our remarks are being made. These accounts, by the former New South Wales Government Entomologist, have in each case been subject of reprints, the original plate published by him in 1897 accompanying them. This historical note need not be burdened with H. Tryon's published accounts, subsequent to 1889, of this fruit fly, since they principally dealt with it from an economic standpoint.

Plant Hosts.—The following is a list of the plant-species whose fruits have served as hosts for this notorious Australian fruit fly:—

Indigenous Flora.—

- Anonaceæ.—(1) *Melodorum Leichhardtii*, Benth.
 Capparideæ.—(2) *Capparis nobilis*, F. v. M.; (3) *Capparis*, sp. indeter.
 Rutaceæ.—(4) *Acronychia lævis*, Forst. (“Cheese Wood,” &c.); (5) *Atalantia glauca*, Hook f.
 Meliaceæ.—(6) *Owenia venosa*, F. v. M.
 Celastrineæ.—(7) *Elæodendron australe*, Vent.
 Rhamnææ.—(8) *Siphnodon australe*, Benth.; (9) *Ziziphinus jujube*, L.
 Sapindaceæ.—(10) *Atalaya hemiglauca*, F v. M.
 Anacardiaceæ.—(11) *Spondias pleiogyna*, F. v. M. (“Burdekin Plum”).
 Saxifrageæ.—(12) *Schizomeria ovata*, D. Don.
 Saxifrageæ.—(13) *Davidsonia pruriens*, F. v. M., Davidsonian Plum.
 Combretaceæ.—(14) *Terminalia* sp.
 Myrtaceæ.—(15) *Psidium guayava*, Linn (“Guava”) naturalised.
 Myrtaceæ.—(16) *Eugenia Smithii*, Poir.
 Passifloreæ.—(17) (*Passiflora aurantia*, Forst.)*
 Cactaceæ.—(18) *Opuntia ficus-indica*, L.
 Rubiaceæ.—(19) *Sarcocephalus cordatus*, Mig. (“Leichhardt Tree”).
 Sapotaceæ.—(20) *Sideroxylon pohlmanianum*, F. v. M.; (21) *Sideroxylon australe*, R.Br. (“Black Apples”).
 Ebenaceæ.—(22) *Diospyros australis*, R. Br.
 Oleaceæ.—(23) *Notelæa longifolia*, Vent.
 Apocynaceæ.—(24) *Carissa ovata*, R. Br.; (25) *Ochrosia elliptica*, Labill.
 Cucurbitaceæ.—(26) *Bryonia laciniosa*, Linn. (T.L.B.).
 Solanaceæ.—(27) *Solanum aviculare*, Forst.
 Laurineæ.—(28) *Endiandra compressa*, C. T. White.
 Urticaceæ.—(29) *Ficus Watkinsoniana*, F.M.B., (*Ficus stephanocarpa* ?); (30) *Ficus glomerata*, Wild.

Cultivated Flora.—

- Anonaceæ.—(1) *Anona cherimolia*, Mill., Custard Apple.
 Bixineæ.—(2) *Flacourtia cataphracta*, Ross, “Flacourtia”; (3) *Aberia caffra*, Harv. & Sond., “Kei Apple.”
 Rutaceæ.—(4) *Citrus aurantium*, L. orange; (5) *C. decumana*, Lour., Pomelo; (6) *C. nobilis*, Lour.; (7) *C. japonica*, Mandarin; (8) Kumquat; (9) *C. limonum*, Risso, Lemon; (10) *Ægle marmelos*, Cort., Bengal Quince.

- Rhamnaceæ.—(11) *Zizyphus jujuba*, L. Jujube.
- Ampelidæ.—(12) *Vitis vinifera*, L. Grape; (13) *V. labrusca*, L., Isabella Grape.
- Anacardiaceæ.—(14) *Anacardium occidentale*, Tar Wood Tree or Cashew; (15) *Mangifera indica*, L. Mango.
- Rosaceæ.—(16) *Cydonia oblonga* Quince; (17) *Eryobotrya japonica* Lindl., Loquat; (18) *Prunus persicus*, Stokes, Peach; (19) *P. domestica*, L., Plum; (20) *P. armeniaca*, L., Apricot; (21) *P. levis*, D.C., Nectarine; (22) *P. cerasus*, L., Cherry; (23) *Pyrus malus*, L. Apple; (24) *P. communis*, L. Pear; (25) *Rubus fruticosus*, L. Blackberry.
- Lythraceæ.—(26) *Punica granatum*, L. Pomegranate.
- Myrtaceæ.—(27) *Eugenia braziliensis*, L. Brazilian Cherry; (28) *Psidium guajava*, Guava; (29) *P. cattleianum*, Sabin, Cherry Guava; (30) *P. littorale*, Radd., Small Yellow Guava.
- Passifloraceæ.—(31) *Carica papaya*, L. Papaya or Paw Paw; (32) *Passiflora edulis* Sims., Passion Fruit; (33) *P. quadrangularis*, L. Grenadilla.
- Cactaceæ.—(34) *Opuntia ficus indica*, L. Edible Prickly-pear.
- Ebenaceæ.—(35) *Diospyros kaki*, L. Persimmon.
- Oleaceæ.—(36) *Olea sativa*, L. Olive.
- Solanaceæ.—(37) *Lycopersicum esculentum*, Mill. Tomato; (38) *Capsicum annuum*, L. var. *grossum*, W. Giant Chili or Pepper.
- Urticaceæ.—(39) *Ficus carica*, Lin. Fig.
- Moraceæ.—(40) *Morus alba*, L. Mulberry.
- Jugulandaceæ.—(41) *Jugulans regia*, L. Walnut.
- Musaceæ.—(42) *Musa cavendishi*, L. Cavendish Banana.
- Palmaceæ.—(43) *Phœnix dactylifera*, Date.

Habitat.—This fruit fly, although designated by W. W. Froggatt the “Queensland Fruit Fly,” is a native of coastal New South Wales as well as of this State. In fact, he has stated that “it ranges as far as Gosford, 50 miles north of Sydney.” H. Tryon, writing in 1889, adduced evidence also that it was met with, damaging fruit, at Port Macquarie as early as 1865. In Queensland it not only occurs throughout the coastal district, but passes far beyond the Dividing Range, even so in the North.

THE QUEENSLAND FRUIT FLY, A NATIVE SPECIES.

Chatodacus Tryoni, Frogg., was regarded some years since as identical with a fruit fly occurring in India, *C. ferrugineus*, Fabricius (Musca).

This identification was made by Bezzi in his memoir, “Indian Trypaneids (Fruit Flies),” &c., 1913. But it does not appear that he had typical examples of *C. tryoni* before him when it was published, much less H. Tryon’s description cited by its author, W. W. Froggatt. Thus he writes under *Dacus tryoni*:—“To judge from a specimen from

Peradniya, Ceylon, labelled by Mr. Froggatt himself, *Dacus Tryoni* is synonymous with the present species (*Bactrocera ferruginea* (Fabr.) Bezzi); the specimens bred from fruits which I have received from Gospad (Gosford) district, New South Wales, through the kindness of Mr. Froggatt, approaching the following variety:—var. *mangifera* Cotes"; regarding which he writes, however:—"It is very probable that this variety is based on bred specimens (*i.e.*, of *B. ferruginea*), its colouring and the peculiar shape of the abdomen depending only on immaturity." (*Op. cit.*, p. 95.)

Elsewhere in the same Memoir, Bezzi again states:—"267—*tryoni* (*Tephritis, Dacus*), Froggatt, 1897 (Agric. Gazette, New South Wales, 410, pl. 8, fig. 1, and Report 1909, 79, pl. 4, fig. 1 and pl. vi.) from Australia, a true *Bactrocera*, with two scutellar bristles, the same as *ferruginea*. "Type in Sydney." *Op. cit.*, p. 80.

It would appear thus that Bezzi has pronounced this conclusion on comparing two insects both labelled by W. W. Froggatt, the one from Ceylon—"D. ferrugineus, Fabr."—the other from Gosford, New South Wales—"D. tryoni."

Now there is before the writer a specimen of a fruit fly male, also labelled by W. W. Froggatt:—"Dacus ferrugineus, Fab. Ceylon," and "Ceylon Froggatt 1908." This insect is certainly not the same as *Dacus tryoni*, Frogg., the so-called Queensland fruit fly—the black mesonatum, the black band along the margin of the 3rd abdominal segment, the black line proceeding backwards from the centre of the latter, and the hyaline costal cells being features that it exhibits that are not met with in Froggatt's species—*D. Tryoni*. Indeed, the Ceylon fruit fly more nearly approaches a form of the *C. ferrugineus* series that is described in this brochure as having been taken at Buderim Mountain, South Queensland:—*C. dorsalis*, Hendel var.

With reference to the Gosford fruit fly assigned to *Dacus Tryoni* Frogg. by W. B. Gurney, in his valuable "Fruit Flies and other Insects attacking Cultivated and Wild Fruits in New South Wales" (Agr. Gaz. New South Wales, Parts 1, 2, and 3, Vols. XXI., 1910, XXII., 1911, and XXIII., 1912), written under the direction of Mr. Froggatt, and an example of which fly was evidently communicated to M. Bezzi, Gurney writes as follows:—"It is noted here that the Queensland fruit fly bred in the Gosford-Narara district and other coastal districts appear to be a distinct var. of the Queensland species—*D. Tryoni*, Frogg. We have developed some 18,000 specimens, and they are decidedly smaller and darker than the Queensland specimens." Part 2, *op. cit.*, p. 722. He further states:—"Within the district we have found actually thousands of these flies as maggots in the wild fruits from January to March, and numbers have been developed from them in our breeding cages, whilst scarcely any infection of cultivated fruit has occurred throughout the district during our investigations," and yet, as he informs us, "ripe oranges, cumquats, peaches, &c., remained untouched in adjacent orchards," *i.e.*, adjacent to these native-fruit-bearing trees, that yielded

freely the flies that he regarded as *D. tryoni*, Frogg.; but with the aforementioned qualification. This circumstance Gurney dwelt upon as indicative of the preference of a native fruit fly for a native Australian fruit.

Again, it may be added that Froggatt, writing on "*Dacus Tryoni*, Frogg., the Queensland fruit fly," summarising W. B. Gurney's observations and alluding to the preference that the fly they dealt with manifested for native fruits, states:—"This tends to show that this fruit fly is a *native* of the coastal districts of New South Wales as well as of Queensland" (Notes on Fruit Flies, Pr. Lin. Soc. N.S.W. 1910, xxxv., and Nov., 1911, p. 865); thus regarding the Gosford and certain Queensland fruit flies as one.

There are, again, before the writer two specimens of the Gosford fruit fly communicated by W. B. Gurney himself, labelled:—"Cheese-wood berries. Narara, N.S.W., 1910." Unfortunately, they are much bleached and shrunken, having been long in alcohol, and only in one is a trace of black persisting on the mesonotum. However, the abbreviation of the supra-alar band ending well in front of the upper posterior supralar bristle suggests distinctness from *C. Tryoni*, Frogg.

Hitherto the New South Wales fruit flies included in *Chatodacus* have been regarded as belonging to a single species, *Chatodacus Tryoni*, Frogg., and possibly, therefore, exponents of more than one kind have been issued by entomologists there under that name, and hence the ascription by Bezzi of a Gosford (New South Wales) yielded fruit fly to *Bactrocera ferrugineus* (Fabr.) now *Chatodacus ferrugineus* (Fabr.).

This great authority informs us that only species or forms of the "ferrugineus group" (i.e., those conforming to the typical Fabricius species, and several fruit flies that are regarded by him as sub-species of it—e.g., *indicus*, Walker, *dorsalis*, Hendel, *pedestris*, Bezzi, *varicolor*, Bezzi, &c.) are attracted by oil of citronella, and the figures of all of them that have been issued under his direction exhibit *colourless costal cells*. Now the Queensland fruit fly, that we are considering, is noteworthy in not manifesting either of these distinguishing features of *C. ferrugineus*, Fabr., *sen. lat.* (Note.—The latter—the wing-feature alluded to—was originally mentioned by H. Tryon, in his description of the insect, as a *Tephritis*—in 1889, and is illustrated by Froggatt, who named it *Tephritis Tryoni*, in the several figures of *C. Tryoni* that grace his publications—notably in Plate (1), fig. 1. (Report for 1907-8), and is, therefore, a type character.

The purpose of this discussion is to maintain for this insect its distinctness from a previously described species, and its claims to be regarded as a native fruit fly, a matter of more than scientific import.

VARIETIES OF CHÆTODACUS, FROGGATT.

Several varieties of the typical species may be characterised. These have special host-relationship. Thus we have:—

A. *Chatodacus Tryoni*, Frogg., *var. Musa*, *var. nov.*—Specimens of fruit flies conforming generally to the typical *C. Tryoni* yielded by the

insects from Geraldton, Gympie, Buderim Mountain and Stanthorpe Districts (imported) all reared from maggots infesting banana fruits, have been examined, after being first isolated as distinct, without any constant characters being revealed whereby they can be distinguished from it in matters of detail. Their general facies, difficult to define in words, perhaps separating them from typical *C. Tryoni*, Frogg.

B., *Chaetodacus Tryoni*, Frogg., var. *Juglandis*, var. nov.—As in typical *C. Tryoni*, but the mesonotum having the area immediately above supra-alar stripe narrowly fuscous posteriorly, a fuscous spot also internal to humeral callus at base of outer scapular bristle and a dark impunctuate narrow fuscous stripe at scutellar border. Moreover, the anterior supra-alar bristle is not decumbent and is therefore conspicuous. In the wing the portion of the costal stripe bordering the sub-marginal cell at its end is waved on inner side, the anal stripe moreover appears unusually broad—the portion within the third posterior cell paler than that in the anal cell and nearly attaining the basal cross vein. The chaetae of head and thorax are dark fuscous.

Type.—Reg. No. D. 3120, Q.M., female.

Host.—Walnut (H. Jarvis); *Locality*, Stanthorpe.

C. *Chaetodacus Tryoni*, Frogg., var. *Sarcocephali*, var. nov.—In this the mesonotum is marked with black as follows:—On each side of the mesial grey fascia a spot or narrow band contiguous with the fore border, this may be sub-circular, or directed towards the suture—be drawn-out and then become obsolete—or again passing by it attain nearly the hind border; isolated or merged with it a spot may occur above the interval between the noto-pleural calli; again a line sometimes absent may define above the supra-alar yellow vitta; the abdomen also dark fuscous, a *white narrow line defining segments 1 and 2*, in addition to pale line along hind border of segment 2.

Type.—Reg. No. D. 3121, Q.M., 2 females and male.

Host.—Specimens of the fly were reared from Leichhardt Tree, *Sarcocephalus cordatus* Mig. Rubiaceæ, fruit that had fallen and become almost dry. Also a single example occurred amongst twenty or more specimens of typical *C. Tryoni* reared from Psidium fruit, the tree growing close to former. *Locality*, Brisbane (H.T.).

(A distinct species—probably; but the bred examples before us being ill-nurtured this question must be now held in abeyance.)

CHÆTODACUS FAGRÆA, sp. nov.

THE FAGRÆA FRUIT FLY, Tryon.

Male and Female. Measurements—

Male.—Length of body 6.5 mm., of wing 6 mm. *Female*.—Do. body with ovipositor extended 7 mm.; ovipositor 1 mm.; wing 6.5 mm.

Head.—Pale, reddish-brown (in dry example whitish); occiput, basal two-thirds brown, post-orbital band whitish; vertex—ocellar spot

in acute angled triangle its apex anterior, the bristle spots pale brown conspicuous, s.or. ones subquadrate approximate, i.or. ones merged with mid-frontal spot, and then attaining lunule; lunule with a central black spot; frons rather narrow; face in central line convex behind, almost level anteriorly—the concavity very shallow; facial spots broad narrowed to a point that falls short of mouth border, gular spot transverse narrow indistinct; antennæ—joints 1, 2 subequal, latter hairy with a short dorsal bristle, joints 3 infuscated on outer surface, bristle long blackish pale at base; palpi, yellowish apparently unusually long—exceeding oral border; cephalic bristles—v. 4 subequal, s.or 1, i.or 2, latter paler, oc.p. about 6 dark, gular present, all dark-brown.

Mesonotum.—Pale reddish-brown, and with appressed very short pale pilosity, a centro-dorsal greyish hoary band without longitudinal dark stripe; pleura and pectus not infuscated; yellow calli spots and bands as in *C. Tryoni*; the supra-alar stripe slightly narrowed posteriorly attaining upper p.sa. bristle; scutellum yellow with two apical bristles only; mesophragma brown with central $\frac{1}{3}$ yellowish; thoracic chaetotaxy, sa. 4 the 2 central longer, pr. sc. 2, n.pl. 2, m.pl. 1, ia, 1, a.sa. 1, p.sa. 2, all bristles dark-brown except m.pl. lighter.

Abdomen.—Yellowish-brown, with tawny appressed pilosity, segments 2, 3, 4, and 5 each with dark-brown patch at sides, segment 2 with posterior half whitish transverse continuous band contiguous with hind borer, segment 3 with the lateral bristles black continued to under surface where longer, oval glabrous patch on segment 5 finely punctured (that of female almost occupying entire side), ovipositor—sheath with segments (abdominals 6 and 7) indistinguishable very long-plus 1 mm., widened in the middle by a membranous low expansion on each side, without longitudinal groove above, but tristriated laterally.

Legs.—Yellow horn coloured, tibiæ of hind-pair with hind face fuscous.

Wings.—Costal cell hyaline uncoloured; costal stripe not exceeding 2nd longitudinal but—as usual—passing along sub-marginal cell at apical border and ending abruptly half-way between 3rd and 4th longitudinal veins, 1st basal cell before 2nd cell fuscous as also stigma, anal stripe formed by anal cell and inner part—widely—of 3rd posterior cell, passing—in male—across 6th longitudinal at wing margin, super-numerary axillary lobe in male scarcely evident.

Types.—Reg. No. D. 3122, male and female.

Host.—Fruit of *Fagraea Mülleri*, Benth. (Loganaceæ)—crimson-lake-coloured (E. Jarvis). *Hab*.—Babinda, N.E. Queensland; bred at Entomological Station (Bur. Sug. Exp. Stn.), 2nd June, 1925. (R. W. Mungomery.)

Note.—This fly is possibly identical with *C. Tryoni* Frogg., but its general light colour, the colourless costal cells, the length and form of the ovipositor, and its size, seem to separate it from that species. The colour and general facies of this fruit fly recalls that of *D. cucumis* (Fr.) that

also extends northwards to the Cairns district; but the latter is at once distinguished by the greatly reduced chætotaxy that characterises it—even generically.

CHÆTODACUS HALFORDIÆ, sp. nov.

THE HALFORDIA FRUIT FLY.

Male and Female. Measurements—

Male.—Length of body 5 mm.; of wing 6 mm. *Female*.—Length of body 6.5 mm.; of wing 6 mm. (*vide* Note, p. 191).

Head.—Pale brownish horn-coloured; occiput without markings; frons-ocellar spot small within a brown triangular mark acutely angled anteriorly, the orbital spots and middle spot also yellowish-brown and distinct; face gradually sloping upwards in front of depression towards mouth-border, facial spots distinct pointed anteriorly, gular spot indistinct; lunule narrow arcuate with central black spots; antennæ extending beyond face, joints 1 and 2 subequal, joint 1 with short yellowish cilia at end above, and joint 2 with a patch, and 1 with a longer hair of this colour on upper face, joint 3 fuscous outwardly and above, bristle with basal portion yellowish; palps oblong compressed yellowish; cephalic bristles as follows:—vt. 4 equal, ocp. 8 short black, s.or. 1, i.or. 2, genal slender, all except ocp. dark piceous.

Mesonotum.—Yellowish-brown, a central broad dorsal vitta slightly narrowed anteriorly to thoracic border grey with pale appressed pubescence, a broad prescutellar transverse band between it and posterior border, dorso-lateral region with three distinct but ill-defined fuscous blotches, one touching fore-border above humeral callus, one in front of suture, and one above supra-alar yellow band, meso-pleural region distinctly black both in front and behind callus, pectus or meso-thoracic pleura also occupied with a black mesially broken blotch; scutellum broad yellow; meso-phragma central $\frac{1}{3}$ yellowish-brown broadly fuscous laterally; calli and stripes yellow as follows:—humeral, notopleural, meso-pleural, a relatively narrow parallel-sided band continuous with last above—and with small sterno-pleural below, supra-alar stripe rather narrow of even breadth reaching p.sa. bristle behind, hypo-pleurals 2 distinct—in each the hind border broadly black, no meso-dorsal or præ-sutural lateral stripe. Thoracic bristles—scutellar 1 pair apical piceous, sep. 4, pr. sc. 2, n.pl. 2, m.pl. 1, inf. al. 1, p.sa. 2, a.sa. 1, all piceous—the scapulars a little lighter; halteres white.

Legs.—Yellowish and with very short pale yellow appressed pubescence, the tarsi fuscous above, spur at end of middle tibia black, fore-femora with a few black bristles on upper surface.

Wings.—Veins—the 1st longitudinal closely adjacent to 2nd, towards its base making marginal cell very narrow here, anal cross vein running straight, not bent inwards at its base (as in *C. Tryoni*, &c.), causing anal cell extension to be parallel-sided. Costal cells hyaline uncoloured, costal band pale-fuscous indistinct except where involving darker-hued

stigma, somewhat convexly widening beyond termination of 2nd longitudinal vein and between it and the 3rd, extending to halfway between 3rd and 4th, the usual darkening of 1st basal cell in front of 2nd basal one, anal fuscous stripe occupying anal cell and its extension and—narrowly—3rd posterior cell where bordering it, in the male fly extending across 6th longitudinal vein at its end into axillary cell; and an ill-developed supplemental lobe also present.

Abdomen.—(Note.—Individuals under notice ill-fed and thus unduly shrunken and elongated therefore), fuscous above and beneath, segment 1 with its posterior margin and segment 2 almost entirely brownish-yellow above, segment 5 with a darker patch on each side above, segment 6 in female (sheath of ovipositor) rather short and broad also flattened above. (In the male segment 3 and 4 brownish above, segment 3 suffused with piceous at sides).

This fruit fly is related to *C. Tryoni*, but is distinguished from it by its smaller size, a difference in colour and pattern of its mesonotum, the colourless costal cells, the shape of the extension of the posterior expansion of its anal cell, the widening towards the end of the costal stripe, and the shape of the facial spots—one or more of which features also separate it from the other Trypetidæ herein described.

Locality, &c.—Southport, South Queensland. *Host*.—The fruit of *Halfordia drupifera* F. v. M. (Rutaceæ). Three specimens communicated by L. Franzen.

Type.—Regis. No. D. 3123, male and female.

CHÆTODACUS ÆQUALIS Coquillet.

THE LARGE AUSTRALIAN FRUIT FLY, Froggatt.

Dacus æqualis, Coquillet: Report 1907-8, p. 91, Pl. III., 11 (wing), 1909, and Froggatt, W. W., "General Account of Fruit Flies (Trypetidæ)" 1909, p. 26, Pl. VI., fig. 11.

In Coquillet's description, reproduced by Froggatt, of *Dacus æqualis*, the following features may be regarded as sufficiently characterising this species for the present.

Female. Measurements.—

Length, including ovipositor, 8 to 9 mm.

Mesonotum.—Reddish-brown, a streak of pale yellow extending along the meso-thoracic suture each side and crossing the meso-pleura (band uniting the humeral and noto-pleural calli—as in *C. Jarvisi*, sp. nov.).

Abdomen (of female) broadly clavate, slightly longer than the ovipositor of the female. (No reference to the existence of any central abdominal line—if present.)

Wing.—A very broad costal band, including not only the coastal, marginal, and sub-marginal cells and stigma (darker), but also the first basal and first posterior cells ("the front margin from the costa to the fourth vein wholly dark-brown"—Coquillet). Froggatt *loc. cit.*, Pl. III., 1.

“This is one of the largest flies, and is remarkable for the very dark broad ferruginous stripe along the front margin of the wing, the long antennæ and the very wasp-shape body” (? due to fact description deals with bred specimens, H.T.). (Froggatt, W. W., *loc. cit.*)

Host.—Orange. Several specimens were obtained by A. T. Hunter in the maggot state in oranges growing near Gosford, New South Wales. (Froggatt.) The existence of the fruit fly in Queensland, in the Stanthorpe area, has been established by H. Jarvis by his finding it in a “lure” accompanying other fruit flies (H. J. *in lit.*).

Note.—The chaetotaxy of *Dacus æqualis* has not been described, and thus the systematic position of the insect, on which this might be expected to throw light, is uncertain.

CHÆTODACUS BRYONLÆ sp. nov. (Plate XXI, fig. 4.)

THE BRYONY FRUIT FLY.

Male and Female. Measurements—

Male.—Length of body 7.5 mm.; of wing 6 mm. *Female.*—Length of body and ovipositor 8 mm.

Head.—Brownish-yellow, pale beneath; occiput without markings;, vertex without transverse bar, a reddish blotch on side of black ocellar spot in some specimens; frons rather broader than half length, not narrowing anteriorly, lateral spots reddish coloured are almost wanting; anterior central spot brown on convexly raised area; face with central part flat, scarcely ascending towards mouth border, lateral spots sub-circular and distinct, gular spot reddish; antenna with 2nd joint longer than 1st; 3rd joint brown terminally darkened, little exceeding twice second, arista piceous with base lighter; cephalic bristles vt. 2 pair, oc.p. about 5 black, s.or. 1, i.or. 2—very indistinct, all dark piceous—almost black.

Mesonotum.—Clothed with short dense appressed yellowish pubescence, almost wholly black showing fundamental reddish-brown colour in places, *e.g.*, spot on upper side of humeral callus, fore-border of transverse suture, pro-pleuron pro-sternum, a line defining meso-pleural callus and above wing insertion; the black dorsal area extending broadly on each side, bounded by the humeral callus, the noto-pleural sulcus, then contracted at the sulcus and passing backwards bounded laterally by supra-alar bands (or it may be described as outwardly convex from hind border to suture following inner side of supra-alar band, bent inwards to exclude a short reddish area embracing both sides of suture, then extending downwards between noto-pleural and humeral callus and directed in a straight line from dorsal side of latter to fore-border); scutellum yellow without marking and with two apical bristles; halteres pale yellow; meso-phragma black glossy; calli, spots, and band, light yellow and as follows:—humeral, noto-pleural, meso-pleural band united below with sterno-pleural callus, supra-alar band from suture to hind border scarcely narrowing hindwards, hypo-pleural (of two conjoined forming

a band as broad as meso-pleural one; thoracic bristles as follows:—sa. 4 & pr.sc. 2, n.pl. 2, m.pl., a.sa. 1, p.sa. 2, ptero.pl. 1, all dark piceous—almost black.

Abdomen.—Pale red clothed above with dense whitish appressed pubescence; basal 2 segments not closely united, segment 1 black with central red transverse band; segment 2 pale reddish with a central transverse black band narrowing and becoming obsolete towards the sides, segments 3 black except in centre of hind-border; a black mesial longitudinal line extending backwards from latter and gradually disappearing before hind-border of segment 5; ovipositor scarcely flattened unusually short, its first two segments not exceeding 5th abdominal 1st joint (sheath) reddish, 2nd yellowish, 3rd glossy red brown; under surface abdomen pale with the sternal scutes black, successively widening to form a conspicuous black ventral patch on hind-border of 3rd segment above at the sides.

Wings.—Outer section of 4th longitudinal vein arcuate, section between small and hind cross vein equal to latter; costal band dark fuscous, extending beyond wing-apex to 4th longitudinal vein, occupying completely costal cells stigma, and both marginal and sub-marginal cells terminally widening beyond the 3rd longitudinal vein and then abruptly narrowing; of this band the portion occupying the costal cells being yellow by transmitted light, and that embracing the stigma darker than the part beyond; the narrow portion of the 1st basal cell anterior to 2nd basal also fuscous; an anal fuscous stripe also present involving anal cell, and—widely—border of 3rd posterior cell along anal cross vein, the anal cell extension being unusually narrow.

In the male this band appears to be occupied with the narrow dark coloured scales, and is dilated at the end, showing in front to the commencement a bulla such as is described to occur in a Philippine Island Fruit Fly, *C. ablepharus*, Bezzi; the wing-veins included in dark markings blacks, or all of them of this colour.

Legs.—Yellow horn coloured coxæ pale reddish, posterior tibiae-infuscated.

The black that predominates on mesonotum, and broad costal fascia of wing distinguishes this species from the *C. Tryoni* Frogg., with which in common it possesses coloured costal cells.

Types.—Reg. No. D. 3124 Q.M. Holo- Allo- and 2 Paratypes.

Hab. and Host Plant.—The fruit fly was reared exclusively from the fruit of *Bryonia lacinosa*, Blackall Range and Brisbane District, and received from Eidsvold, where similarly bred from the same fruit by Dr. T. L. Bancroft.

Note.—Apparently this fruit fly is also similarly associated with the fruit of *Melothria cunninghamii*, F. v. M., an allied cucurbitaceous plant.

CHÆTODACUS DORSALIS, Hendel.

THE SOLANUM FRUIT FLY (Plate XX., Fig. 3—Male).

Syn. Dacus dorsalis, Hendel—"The genus *Dacus* Fabr. 1805 (Diptera), Supplementa Entomologica I, 18, 3, pt., fig. 3, 1912.

Chætodacus ferrugineus dorsalis, Hendel, Bezzi, Philippine Journ. Sc. XV., 5, p. 418, 1919.

**Dacus zonatus*, Howlet—E.M. Bull. Ent. Res. X. Pt. 3, Pl. XIII., figs. 1 and 2 (*non. Dacus zonatus*, Saunders, W.W., 1841).

"The Solanum Fly" H. Tryon *passim* in Reports Entomologist, Department of Agriculture, Queensland.

Male and Female. Measurements—

Male.—Length of body 6 mm., of wing 5 mm. *Female*.—Length of body and ovipositor 7.5 mm., of ovipositor 1.5 mm., of wing 6 mm. (Note exceptionally the male fly may attain a length of 7 mm. with a wing length of 6 mm. In a large series from different sources individual variations below this major limit are very numerous.)

Head.—Occiput broadly brown with the orbital border yellowish and therefore well demarcated; frons of equal breadth and with regular contour brownish yellow. Ocellar spot black continuous on each side with a blackish transverse stripe of same colour, three black spots along each side (fronto-orbital bristles); lunule very short (transversely) black with mesial furrow; face yellow with the usual black spot on each side; antenna, reddish, first and second segments subequal, third joint brown, arista darkening beyond base; cephalic—chætotaxy, v.t. 4—piceous, oe.p.; usually 5 brown, or blackish, s.or 1 i.or 2, gular present, pale-brown.

Mesonotum.—Reddish brown densely finely punctured, clothed with short greyish pubescence; a centro-dorsal narrowly triangular black patch having its base at scutellum and apex at fore border, with a narrow transverse præ-scutellar band of this colour extending laterally from its base, with a smaller black also narrow triangular patch attaining only the suture; the sterno-pleuron, and an oblong patch continuous with it, and ascending broadly along the fore-border of the mesopleuron, also black, mesophragma with downward extension behind post-alar calli, black too. Calli and bands as follows:—humeral, noto-pleural, mesopleural, post-alar (hypopleural), calli, and a post-sutural supra-alar almost parallel sided band, and scutellum light bright yellow. Thoracic bristles as follows:—sa. 4, pr. sc. 2, a.sa. 1, p.sa. 2, n.pl. 2, m.pl. 1. Scutellar 2 terminal, these towards end piceous, paler at base.

* *Note*.—This inclusion of *Dacus zonatus*, Howlet, in the synonymy of the species is based on the figures—cited in the reference—showing the thoracic marking—a black lanceolate longitudinal one. In *Dacus zonatus*, Saunders, as stated by Bigot, as figured by Bezzi (1913, Pl. VIII., fig. 4), and as illustrated in specimens—two specimens from Peach Orchard, Pusa, June, 1905 (W. W. Froggatt), before the writer, "The wing is marked with a small blackish patch, situated at the extremity between the costal nervure and the 3rd longitudinal nervure of Rondani" (Bigot).

Wings.—Costal cell on both sides of cross vein hyaline and entirely non-colourous (not pale flavous as in *D. Tryoni* Frogg.); costal border dark, well defined extending continuously from costal cells to nearly half way between 3rd and 4th longitudinal veins, embracing stigma and marginal cells entirely, and bordering the submarginal one outwardly slightly widening towards its termination, a slight infuscation also in portion of 1st basal anterior to 2nd basal; stigma reddish-brown. Anal stripe distinct, formed by pale yellowish-brown of anal cell and a fuscous band in 3rd posterior cell along anal cross vein and 6th longitudinal. In the male this fuscous band is continued in a patch at the margin of the wing—in the axillary cell. The male fly has also the supernumerary lobe of latter. Costal vein, 1st and 2nd longitudinal axillary and anal cross vein reddish—others yellowish horn-coloured, costal vein, 1st longitudinal, and 3rd towards its base spiny.

Legs.—Yellow, the tibiæ of 3rd pair brown; spine at end of tibiæ of 2nd pair, and tarsal spinelets black.

Abdomen.—Reddish with appressed greyish white pubescence above with 1st segment infuscated, 3rd segment with a black patch occupying broadly each side, these united with a band of the same colour along the fore-border, the lateral black colouration involving 4th segment and base of 5th, and continued beyond in a black marginal line. A longitudinal mesial dorsal broad black line transversing segments 3, 4, and 5 continuously in both sexes and showing in short 6th in female; black fringe (or pecten of hairs) on posterior margin of 3rd segment at the side, well developed, black; venter with the sternites dark coloured (fuscous) especially the first; those of 3rd, 4th, and 5th progressively increasing in size and intensity of colour. Ovipositor, with 1st segment (7th abdominal) well developed equal to 6th abdominal, tumid above glossy brownish red with straight narrow margins.

Plesiotypes.—Reg. No. Q.M.D. 3125, 2 males, 2 females: var. *major*. H.T. Reg. No. Q.M. D. 3126.

Food Plants.—These as far as observed comprise only:—*Solanum verbascifolium* Lin. and its close ally, *Solanum auriculatum*, and exceptionally *Capsicum* (especially *C. grossum*, the giant capsicum), the “chili” of Australia and “pepper” of elsewhere.

Hab.—Coastal Queensland and New South Wales—from Sydney, northwards, extending in the west to Stanthorpe (H.J.) (possibly introduced there intentionally by man) and at Eidsvold (T.L.B.). It moreover has a very wide extra-Australia range. That it should therefore occur in Queensland is not surprising, inasmuch as this extended distribution includes the region of India, Java, and the Philippine Islands.

Note.—This fly, that H. Tryon formerly (1920) distinguished from the so-called “Queensland Fruit Fly” under the name of *Solanum Fly*, he is now led to regard as being *Dacus dorsalis*, F. Hendel 1912, a member of the *Dacus ferrugineus* Fabr. group and therefore one denominated by M. Bezzi—*Chatodacus ferrugineus dorsalis*, Hendel!

(“Fruit Flies of the genus *Dacus sensu latiore*, Diptera, from the Philippine Islands”—Phil. Jnl. Sc. XV., No. 5, pl. & 23, 1918). Hendel’s description of it, based on a fruit fly from Formosa, is in his paper on the “Genus *Dacus*, Fabr. 1805 (Diptera)—Supplementa Entomologica (I, 18, 3, pls, fig. 1, 1912) and that of Bezzi is embodied in his systematic key to Philippine species of *Chatodacus* (Bezzi M., *op. cit.* supra pp. 17 & 20). This fruit fly is readily distinguished amongst Australian Trypetidæ by morphological features as well as on physiological grounds. According to Bezzi (1916 p. 12) the fruit flies of the “ferruginus group” are the only ones attracted by oil of citronella (Metheugnoi), and the present species is one to which this applies in marked degree. Again its injurious relations to fruits is similarly limited here, as elsewhere, to those of a very few plant species, and especially to two *Solanums* of very widespread occurrence, the only economic one being the chili (*Capsicum*).

So restricted and exclusive indeed is this plant relationship that, notwithstanding the fruit of several other Solanaceæ—both native and naturalised species, growing here in addition to those named—have been examined, in no instance have they proved to harbour the maggots of this fruit fly.—*Chatodacus dorsalis*, Hendel. Howlet F.M. (Bul. Entom. Res. VI., Pt. 3, Pl. XIII., figs. 1 and 2, 1917) figures under *Dacus zonatus*, Saunders—a fruit fly that, as his illustration indicates, has exactly the peculiar black pattern of colour of the mesonotum that characterises the Queensland fly, *i.e.*, a mesial black bar commencing broadly at the foreborder and gradually narrowing to a point on the hind one. However, evidently when Howlet wrote, it had not been recognised that *Dacus dorsalis*, Hendel, occurred in India, and doubtless had been confused previously with *Dacus zonatus* (Saunders) amongst whose food plants the fruits of Cucurbitecæ had been included.

CHÆTODACUS BARRINGTONIÆ, sp. nov.

BARRINGTONIA FRUIT FLY.

Male and Female. Measurements—

Male.—Body 7.5 mm., wing slightly exceeding 6 mm. *Female*.—Including ovipositor 8 mm. (*Note*.—The measurements of several males ranged from 6 to 7.5 mm.—length of body.)

Head.—Horn yellow coloured, occiput with the sclerites outlined with fuscous; frons more than twice as long as broad of almost equal breadth: concave from side to side between s. or, in front a raised area with a low mesial arched keel corresponding in position to the dark central frontal area, its more elevated part being black: ocellar spot black small but distinct, frontal lateral spots indistinct; face almost level along middle line, scarcely ascending beyond depression to mouth border, facial spots subround distinct, gular spots distinct; antennæ with joint 2 rather exceeding joint 1, joint 3 reddish-brown with outer face and end fuscous, arista dark piceous reddish basally, palpi oval reddish-brown; cephalic bristles:—vt. brown s.or 1 and i.or 2 black, ocp. black and 7 in number.

Mesonotum.—Reddish brown with pale golden-yellow appressed pubescence without central pale stripe, but (as seen in oblique light especially) with narrow brown mesial line from almost fore to hind border, and parallel to it on each side a similar line starting above humeral callus and reaching also almost hind-border, curved outwards in front of and inwards at level of suture; scutellum evenly punctured with 2 long terminal bristles, meso-phragma pale reddish-yellow, the posterior third a broad brownish band; calli and stripes yellow, humeral clothed—as in other Chætodaci—with erect white pubescence, mesopleural the same, meso-pleural distinct from humeral, supra-alar from suture to p.sa bristle, rounded at each end, and of almost even breadth, hypo-pleural calli, contiguous to meso-phragma; thoracic chætotaxy as follows:—sep. 4 the middle pair shorter, n.pl. 2, pr.sc. 2, s.al. 2 posterior 1 anterior (small), m.pl. 1—bristles all—including scutellar ones—castaneous-brown.

Abdomen.—Rugose punctured with grey depressed pubescence, dorsum with slight mesial impression, segments 1-2 pale-reddish horn coloured clouded with fuscous in the centre along hind-border of segment 1, segments 3, 4, and 5 outwardly dark fuscous, the discal $\frac{1}{3}$ in each pale-reddish horn yellow (exceptionally those segments wholly fuscous above, the yellow being restricted then to hind borders of 3 and 4). Male with pecten of black bristles on hind-border of segment 3 at sides. Female with sternites and ovipositor.

Wings.—With veins horn-yellow, costal, 1st and 3rd longitudinals with dark bristles, costal cells hyaline and non-colourous, costal-band pale-fuscous, not widening to beyond 2nd longitudinal, narrowly following along end of submarginal cell and becoming gradually obsolete beyond 3rd longitudinal vein: wing fuscous in narrow portion of 1st basal cell in front of 2nd basal; anal fuscous band occupying anal cell and the portion of the 3rd posterior one bounding anal cross vein: in the male fly this unites at the wing-margin with a slight infuscation in axillary cell: supernumerary lobe in male not much developed, marginal cell very narrow, 3rd longitudinal vein waved, outer portion of 4th distinctly arcuate, small cross vein joins discal cell well beyond middle.

Legs.—Yellow, slightly darkening beyond 1st tarsal joint; tibiæ of 3rd pair piceous on external face; spur of middle tibiæ brown.

Type.—Reg. No. Q.M. D. 3127. Holo- Allo- and 2 Paratypes.

Host.—Fruit of *Barringtonia calyptrata* R. Br. Fam. Lecythidaceæ usually with high infestation (received from J. W. Ross, Horticultural Instructor, Department of Agriculture). *Loc.* Cairns, North Queensland.

CHÆTODACUS MUSÆ, sp. nov. (Plate XXII., fig. 7.)

Syn. Dacus nigrofasciatus, Froggatt, *ms.*

BANANA FRUIT FLY.

Male and Female—

Male.—Length 7 mm., wing 6 mm. *Female*.—Length of body with ovipositor, 7 mm., wing 6 mm.

Head.—Brown; occiput pale brown without markings or indistinct brown mark above foramen; vertex-ocellar spot without bar extension laterally; frons, length about twice width with conspicuous series of 3 lateral spots and distinct purplish brown central spot in front (sometimes obsolete), lunule glossy concolorous with head; face scarcely ascending to mouth border, facial spots circular isolated from mouth-border, a small indistinct brownish spot in front of eyes (on jowls); antennæ brown, 2nd joint rather longer than 1st, 3rd joint brown darker—almost black, on outer surface beyond arista, this dark-coloured lighter at base; palps pale-coloured; proboscis brown; cephalic bristles, two pair of weak fronto-orbitals, and generally those of *Dacus* (sens. strict) present, colour dark-brown.

Mesonotum.—Closely punctulate, clothed densely with short yellowish appressed pubescence, general colour reddish-brown. Dorsum black showing indistinctly underlying colour red brown, in front and behind from scutellar to anterior margin, bounded at first laterally by supra-alar stripe then suddenly convexly narrowing towards suture, thence anteriorly parallel sided, emitting on each side at right angles and half-way to noto-pleural suture a similarly coloured terminally rounded stripe. (*Note*.—This may almost separate off as a spot); a patch contiguous in front to meso-pleural stripe, the pectus and infra-alar region dark-brown*; meso-phragma, having a broad yellowish central band widening at scutellar margin, then continuously black on each side downwards behind hypo-pleural calli; scutellum yellow with apical pair of setæ only; yellow markings as follows:—humeral calli, notopleural calli, meso-pleural band united with sternopleural calli below, and hypopleural calli—conjoined. The yellow supra-alar band extends from suture almost to scutellum, without narrowing posteriorly. (*Note*.—No yellow band uniting humeral and notopleural calli, as occurring in *D. Jarvisi*. Tryon.) Thoracic bristles—pr.se. 2, p.sa. 2, a.sa. 1, n.pl. 1, m.pl. 1, sep. 4, all brown.

Abdomen.—Unusually widened with convex sides—especially in female, and uniformly pale orange-brown, also with whitish appressed pubescence; 1st and 2nd segments distinguishable above, 1st brownish at centre and at sides, 2nd with a transverse band at junction of 2 slopes, a line continuous along hind-border of 3rd narrowing at sides united with a lateral brown mark on the same segment that is continued shortly along the hind-border—the interval between the two a somewhat palish band; a very indistinct black longitudinal mesial line traverses 4th and 5th segments; ovipositor, with the sheath (7th abdominal segment) short.

* In a banana fruit fly (var., *dorso-picta*, Tryon) illustrating a varietal condition, we find the dorsum coloured as follows:—A mesial reddish-brown fascia bounded by two parallel black streaks in front of suture, and behind it suddenly widening and extending parallel to suture border. These then either continuing laterally to and along supra-alar yellow stripes, or a red bounded black stripe may separate one and the other; between these, and sometimes united to them, half-way between suture and fore-border on pleuron a spot. In the insect above described the dorsal-lateral black stripes evidently unite to form a single patch.

Wings.—Costal cell—both divisions—hyaline and noncolourous; costal band fuscous, not passing in middle 2nd longitudinal, continues around apex to half-way between 3rd and 4th longitudinals without widening, 1st basal cell above 2nd basal cell also fuscous, stigma included in costal band darker than it; anal stripe embracing anal cell and the portion of anal cross vein bounding 3rd posterior cell—without bulla in male; veins brown, darker when included in fuscous bands.

Type.—Reg. No. Q.M. D. 3128. Holo- Allo- and 2 Paratypes, ex *Musa cavendishi*. Reg. No. Q.M. D. 3129. Holotype, ex *Musa* sp. (indigenous).

Host Plants and Habitats.—(1) Wild Banana—*Musa Banksii*, R.Br. (indigenous) Cardwell (Dr. T. L. Bancroft), Babinda, North-East Queensland (Becker). (2) Cavendish Banana—*Musa Cavendishi*, Cardwell, Johnstone River, Babinda, Cairns, &c., and Stannary Hills (Dr. T. L. Bancroft).

The so-called “Queensland Fruit Fly” having the cultivated banana for a host, it was formerly concluded that all damage experienced by this fruit was due to it. However, in 1908 W. W. Froggatt submitted an example of the species above described with the intimation that it had been bred from bananas that had come from Queensland. Since then, from 1909 onwards, the same fruit infested with the present fruit fly was met with in both the Cairns and Johnstone River districts, it being reared from specimens therefrom. In “The Banana in Queensland,” by A. J. Boyd, Department of Agriculture, Qd., Brisbane, 1911, writing under the heading “Fruit Fly,” H. Tryon stated as under: “The fruit fly that is found associated with the banana in tropical Queensland differs from typical *D. Tryoni* in having the dorsum of the prothorax suffused with black, this portion of the body, therefore, presenting an unusual darkening of colour. The abdomen again is differently coloured.” *Op. cit.* pg. 26. Early during the present years, Dr. T. L. Bancroft communicated—a matter of much interest—examples of *Chaetodacus musæ* bred from an indigenous banana (*M. Banksii*) as emanating from Cardwell; and we have also received the same insect having also this plant’s fruit for its host, from Babinda. Our own observations in the districts of its occurrence lead us to conclude that it will puncture the fruit when this is still quite green. It was formerly understood that W. W. Froggatt proposed to name a similar fruit fly received from Fiji—*Dacus nigrofasciata* n.sp.

CHÆTODACUS BANCROFTII, sp. nov.

THE BANCROFT FRUIT FLY.

Male and Female. Measurements—

Male.—Length 7 mm., length of wing 5.5 mm. *Female*.—Length of body and ovipositor withdrawn 7.5 mm., of wing 6 mm.

Head.—Reddish-orange (lighter coloured when dry), occiput yellowish with post-orbital area light-brown; vertex with orbital spot

simple; frons about as long as broad of nearly even breadth with whitish pubescence especially on posterior area and at sides to a noteworthy extent, central spot more or less indistinct, lateral spots only posterior indicated; lunule glossy narrowed gradually on each side not dark coloured or prominent; face glossy, little raised only in front of depression, rather short, gular spot wanting; antennæ with joints 1 and 2 subequal, 1 brownish, 2 yellow, 3 joint outwardly and terminally fuscous little exceeding joints 1 and 2; palpi pale-brown with upper margin straight lower convex, sides of gulæ adjacent to mouth-cavity with short hairs, similar ones on sides of tongue; cephalic bristles ver. 4 piceous, s.or. 1, i.or. 2, in both cases black and directed transversely inwards. Oc.p. about 5 black, gular bristle wanting.

Mesonotum.—Reddish-brown but dorsum in great part—especially in female dull black, finely rugose punctate with black patches on other parts and whitish pubescence; dorsum with suture well defined at sides only, the outline of the black area—bounded by a broad red border—proceeds from fore-border in a straight line to level of humeral callus, behind, then is continued lateral in a round-ended extension towards the interval between the notopleural calli, thence bordering the suture curves abruptly outwards and follows the inner arched border of the supra-alar band, being blotched with red in front of the scutellar border, and including red marks behind anterior one. (In the male there may be two red bars separated by a narrow black line in the latter situation, whilst at the scutellum the border may be entirely red with its front margin broken by 2 or 4 cusps of the same colour). Scutellum pale yellow with *a conspicuous dark band above, between the apical bristles* involving surface beneath; mesophragma black with a central yellow broad stripe continued backwards from behind fore-border; pectus on each side between 1st and 2nd coxæ black, the colour extending laterally on mesopleuron contiguous to yellow band in front; calli and spots sulphur yellow, humeral entire, mesopleural stripe almost parallel sided, extending to posterior supra-alar bristle; thoracic chatotaxy.—sep. 4, n.p. 2, s.a. 1, anterior-small, 2 posterior, pt. 1 weak, these chætæ uniformly very dark brown.

Abdomen.—Shortly top-shaped, uniformly orange-yellow as in *C. musæ*, Tryon, with faint brown hue (pale reddish-brown in dry specimens), segments 3, 4, and 5 of subequal length, segment 6 in female about equal to 5, ovipositor very short.

Wings.—Costal cell hyaline uncoloured, stigma long and very attenuated pale fuscous, costa 1st and 3rd longitudinal bristly; costal stripe narrow and indistinct continuous with stigma, filling narrow marginal cell and proceeding along the submarginal border around apex to just beyond 3rd longitudinal without widening; 1st basal anterior to 2nd basal cell also fuscous; anal stripe formed by darkening of anal cell a wide portion of 3rd posterior and adjacent inner extension of anal; no darkening at end of 5th longitudinal.

Legs.—Yellow, tibiæ darker yellow, tarsi hyaline.

This fruit fly is readily distinguished by the black figure occupying almost the entire dorsum of the mesonotum—one that recalls that of the Indian species—*C. diversus*, Coquillet, and melanic varieties—as described—of *C. persicæ* Fabr.; its almost uniform pale reddish-brown rotund abdomen, however, distinguished it from either. Its scutellar dark brown is again characteristic.

Type.—Reg. No. Q.M. D. 3130. Holo- Allo- and 1 Paratype.

Habitat and Host.—The examples under review were reared from *Cudrania javanensis*, Trecul, *var.* Bancroftii (Urticaceæ), but it also occurs in this association in districts as wide apart as the Brisbane and Herbert Rivers. It is noteworthy that the maggot of this fly acquires the yellow colour that—as is well known—is a feature in some of the tissues of its plant host. The writer is indebted to the Queensland Board of Forestry for the specimens examined for the purpose of this description and that were from the Gympie district, and particularly so to Deputy Forester F. C. Epps and two of the field officers. It is the most handsome of our Trypetidæ and is dedicated to Dr. T. L. Bancroft, whose co-operation also has been so signal and so continuous.

CHÆTODACUS JARVISI, sp. nov. (Plate XXI, fig. 6).

THE JARVIS FRUIT FLY.

Male and Female. Measurements—

Female.—Length of body with ovipositor, 7.5 mm., of ovipositor 2 mm., slightly more, of wing 6 mm.

Head.—Pale reddish-brown, lighter coloured beneath occiput, pale brownish-yellow without markings (in some examples the sides of the foramen, bearing a white fringe of hairs, fuscous); vertex, without marking bordering black ocellar spot; frons dull, about twice as long as broad, slightly widening anteriorly, central spot on low convexity present, lateral black spots obsolete; lunula glossy paler than frons; face little prominent in front with usual 2 black spots; palpi oblong, jowls silvery grey, sub-ocular spot absent; cephalic bristles as follows:—vt. 4 brownish-yellow, s.or 1 and i.or 2 black, ocp. *wanting*, bristle on jowls pale brown.

Mesonotum.—Surface finely punctured, clothed with short greyish pubescence, suture non-continuous, reddish-brown with a mesial and 2 lateral narrow brown stripes, the former not continued to scutellum, enclosing a wide longitudinal greyish band; pleura reddish, a dark patch on mesopleuron in front; yellow calli, spots, and stripes, as follows:—(1) humeral callus entirely, (2) notopleural callus, (3) hypopleural callus double, (4) *a broad band between 1 and 2 making with them a continuous notopleural stripe*, (5) mesopleuron stripe continued by a spot on sterno-pleuron, (6) a parallel-sided supra-alar stripe extending from suture almost to scutellum. Mesonotal bristles as follows:—sa. 4, pr.sc. 2, n.pl. 2, m.sp. 1, p.sa. 2, a.sa. *wanting*; scutellum yellow with 2 apical bristles. All the bristles yellowish-brown (or castaneous); meso-phragma red with the sides broadly fuscous.

Abdomen.—Broad, paler than mesonotum, similarly pubescent, segment 1 brown, segment 2 with a broad transverse white band extending to sides bounded in front by a black outwardly narrowed line, and behind along the base of the 3rd segment by a wider evenly-broad black band also; a longitudinal black mesial band, broken at segmental incisures, continued from latter through 3rd, 4th, and 5th segments. (Male with pecten—present in *Carreya* var.—of black bristles at the sides of hind border of segment 3). Ovipositor long—when extended—equalling segments 3, 4, and 5; basal section brown glossy and swollen at base (tumid upper surface), 2nd equal to basal one above; venter very pale coloured, except sternal sclerites 4, 5, and 6 that are brown.

Wings.—Glossy, veins pale-horne coloured, small cross vein distant from hind cross vein rather further than length of latter (*i.e.*, length between small and hind cross vein exceeding length of latter). Costal cell with both divisions hyaline colourless; costal brown band including stigma, occupying marginal cell, and faintly tinting just beyond 2nd longitudinal submarginal one, and bounding it outwardly along wing-margin and extending to half-way between 3rd and 4th longitudinal, ending abruptly after first widening, thus forming an apical dark wing patch; anal brown band occupying anal cell and extending along outer 3rd posterior cell adjacent to anal cross vein extension; 1st basal cell in front of 2nd basal also infuscated.

Type.—Reg. No. Q.M. D. 3131; 1 female. Reg. No. Q.M. D. 3132; Holo- and Allotype, var. *Careya*.

Habitats and Hosts.—Hab. 1 Stanthorpe, South Queensland, altitude 3,000 ft., taken at large and reared from maggots infesting both pear and quince (H. Jarvis).

Hab. 2, Bowen (1 Rainford), Rockhampton District and Burnett Heads (Dr. T. L. Bancroft), grossly infesting the fruit of *Careya australis* (Sapotaceæ) (var. *Careya* Tryon).

Hab. 3, Howard, Burrum River; captured (Prest).

Note.—This fruit fly is readily distinguished from other species of *Chetodacus* in having a broad yellow longitudinal band uniting the humeral and notopleural calli. Moreover, it is peculiar in the livery of the 2nd and 3rd abdominal segments—the white black bounded transverse band being characteristic. Again it is without both post-orbital and anterior supra-alar bristles, a feature only found in *C. cucumis*, French—a fruit fly that, however, has its own very special features.

The present species, again, was originally regarded as being an insect that had the sapotaceous plant *Careya australis*—locally known as Cockatoo Apple or “Wild Guava,” and whose fruit may be grossly infested by its maggots, exclusively for its host. And, although, from specimens received from 1912 onwards there was evidence of its numerous occurrence with this plant association in the Bowen, Rockhampton, and Burnett Heads districts, no suggestion had arisen that in any one of them did it attack any of the cultivated fruits grown therein. In 1922,

however, H. Jarvis submitted a fruit fly that, he pointed out, was very distinct in its markings from *C. Tryoni*, Frogg., or from any of its varieties—a fruit fly that he had reared at Stanthorpe sparingly from both peaches and apricots, grown there.

This insect became known as the "Jarvis Fruit Fly," and being injuriously related to deciduous fruit its discovery was regarded as of considerable interest. The Jarvis fruit fly, then, having thus been met with in a district very remote from any known habitat of *Careya australis*, and being both larger and of a general darker colour than the fruit fly yielded by it, it did not at first present itself as a probability that these two insects were identical or even allied. However, on H. Jarvis—who had meanwhile received specimens of the former from Dr. T. L. Bancroft—instituting a closer comparison, that they were really representatives of a single fruit fly species, was the conclusion he arrived at. In fact, on examining them closely no features of distinction, except those above mentioned, have been remarked. This interesting discovery accordingly suggests that the Jarvis fruit fly has, as an addition to *Careya australis*, a second indigenous fruit-bearing tree for its host, *i.e.*, one yielding sustenance for its maggots, or that *Careya australis* has a far more extended range of occurrence than is at present known to occur.

Gen. **BACTROCERA**, Guerin-Meneville 1838.

BACTROCERA CAUDATUS (Fabr.) *aff.* (Plate XXIII., fig. 9).

CUCURBIT FLY MIMIC.

Syn. Dacus caudatus Fabricius Syst. Antl. 276, 16, 1905.

Syn. Dacus caudatus, Wiedemann, *pars.* Auss. Zweifl. II., 518, 8, 1830.

Syn. Dacus caudatus, Fabr. de Meijer Tijdschr. v. Entom, LI., 179, 5, 1908.

Syn. Bactrocera caudata (Fabr.) Bezzi, Indian Trypanoids, p. 97, Pl. VIII., fig. 8 (wing), Mem. Ind. Mus. III., 1913.

Other references, *vid.* Bezzi M. l.c.).

Measurements—

Female.—Length of body 8 mm.; of wing 8 mm.

Head.—Pale brownish-orange, glossy; occiput, lateral convex portion posterior to eyes, yellowish horn coloured, central portion yellowish-brown with narrow brown lines defining sclerites, these being parallel continuous with inner border of eyes, two curved inwards from middle of each of these lines and meeting at occiput, and one on each side just behind this point obliquely to eye; vertex-spot black very distinct extending slightly backwards from hind ocelli; frons—about twice as long as broad, slightly arcuate outward at sides, lateral areas rather wide, punctulate pubescent, central area impunctate glabrous, slightly swollen anteriorly towards central spot, latter composed of a narrow crescentic

black portion with a sub-circular orange mark in its concavity in-front, an indication of a narrow dark line between ocellar and frontal spots; lunule—narrow formed by two small convexities fuscous; face—in form rather long equilateral triangle, nitid, convex as usual along middle line, portion in front of depression short slightly sloping upwards to mouth border, facial spots rather small but distinct, oval, remote from mouth-border; gular spot touching eye rather indistinct, cheeks narrow, dull; mouth concavity marked by a fine line, within which is a narrow pale band and then a fuscous wider one, the latter interrupted in middle, but very distinct; palpi, curved yellow; antenna joint 2 a little longer than 1, latter parallel-sided, stout, former narrowing proximally, joint 3 uniting closely with 2, basally yellow and glossy, beyond greyish, arista fuscous with basal portion yellow; cephalic chaetotaxy vt. 2, 2, p.oe. wholly wanting. (*Note.*—Short pale hairs of pubescence might be mistaken for them), orb—2 superior and 2 inferior, latter weak, no 3rd one discernible, all black.

Mesonotum.—Pale reddish-brown, finely rugose punctate and with yellow appressed pubescence; from just before suture and reaching level of upper supra-alar bristle a mesial yellow bar starting as a point and widening posteriorly, also an ill-defined yellow patch bordering the suture in-front on each side; a pale greyish-brown mesial longitudinal scarcely evident band and black markings as follows:—On each side a short bar in front of suture, opposite interval between humeral and noto-pleural calli, widely broken at suture and thence continued by a second broader band of same colour along the upper border of supra-alar yellow band as far backwards as is mesial yellow stripe, meso-pleuron narrowly in-front and a spot on sterno-pleuron also fuscous; mesonotal yellow calli as follows:—humeral large occupying two sclerites, noto-pleural small, widely separate from latter but contiguous above to meso-pleural; latter large occupying almost mesopleuron, sterno-pleural contiguous to latter also large, hypo-pleurals conjoined, sub-equal isolate; supra-alar band not very distinct (in type specimen) narrowing posteriorly; scutellum rather broad, uniformly yellow; mesophragma with central third pale reddish-brown, outer thirds dark fuscous or black—the latter colour not extending to hypo-pleural region, the line separating central and lateral areas convex inwards. Mesonotal chaetotaxy as follows:—sc. 4 sub-equal. hu. wanting, pr. su. wanting, n.pl. 2, n.pl. 2, m.pl. 1, inf. al. 1, s.al. 1 anterior 2 posterior, p.sc. 2. *Scutellar bristles*, 2 pairs—an *apical* and a *lateral*; all bristles black.

Abdomen.—Elongated (bred and ill-fed specimen), yellowish, punctuate with yellow-golden appressed pubescence, and with black markings, segments 1 and 2 well defined; segment 1 with transverse rugæ above distinct, a broad black band occupying anterior half of disc and sides wholly (*i.e.*, all except central portion); segment 2 with black patch in the middle crossing hind part of anterior third not extending to sides, also a narrow dark grey band along posterior border, the yellow colour paler than elsewhere; segment 3 a dark narrow band along fore-border widening at sides occupying there one-half length; from latter

band a longitudinal also dark one extends centrally through 3rd and 4th and 5th segments, segment 4 almost wholly fuscous at sides and segment 5 only towards its under surface, the dark area narrowing posteriorly; segment 6 (base ovipositor) tumid, glossy almost glabrous above, ovipositor stout.

Legs.—Femora horn-yellow gradually passing to orange-yellow distally, tibiæ and tarsi orange-yellow, hind pair light fuscous distally, terminal spur of middle tibiæ castaneous, femora of first pair without bristles.

Wings.—Veins orange-brown except where within dark markings; costa and 1st and 3rd longitudinal veins bristly; 2nd basal cell rather elongated more than twice as long as broad, slightly narrowed proximally, costal cells transparent and colourless, the 1st only slightly pale-yellow; costal fuscous band to 2nd posterior (*i.e.*, not filling sub-marginal cell except terminally where it bounds it), sub-marginal cell with pale yellow suffusion), terminating indefinitely about half-way between 3rd and 4th longitudinal veins, an oval fuscous patch occupying broadly for some distance the end of the 3rd longitudinal vein and attaining wing margin (as in *C. cucurbitæ* Coq. and its allies). Outer sector of 5th longitudinal and hind cross conspicuously margined with fuscous, this colour not continued outwardly along small cross-vein (as it is in *C. cucurbitæ* Coq.); anal cell, and its extension, and adjacent portion of 3rd posterior one widely fuscous and forming an anal band.

Plesiotype.—Reg. No Q.M. D. 3133; one male.

Host.—Fruit of *Bryonia laciniosa* (Cucurbitaceæ), H. Jarvis.

Locality.—Eidsvold (Dr. T. L. Bancroft) and Eumundi (Hall).

Systematic Relations.—M. Bezzi in his "Fruit Flies of the genus *Dacus* sensu latiore (Diptera)," Phil. Jnl. Sc. xv., 5th November, 1919—in treating of that group of *Chatodacus*, Bezzi 1913, that he distinguishes as comprising the larger fruit flies having, *inter alia*, "the 4th abdominal segment without complete black cross band or rarely with a very narrow one and the last two segments of the abdomen with a black longitudinal middle stripe" divides it into two sections—one characterised by the "scutellum with one pair of bristles, the apical one," and the other by "the scutellum with two pairs of bristles, the basal and apical (ones) being equally developed" (*op. cit.*, pp. 18 and 19). Amongst the former he includes *Chatodacus cucurbitæ*, Coq.; that, however, is exceptional amongst them in possessing "three pairs of lower fronto-orbital bristles" and a "bright yellow middle (meso-notal) stripe beyond the suture." These two exceptional characters of *C. cucurbitæ*, Coq., are, however, present in each of the species of Philippine Island fruit flies comprised in his second group—insects with 4 scutellar bristles—from which he excluded it. Moreover, they are also exhibited in the above-described Queensland species. However, although it has, in common with them, these two pairs of scutellar bristles, it differs from each in having the broadly infuscated hind cross-vein; but not so if—differing from Bezzi—

we follow de Meijere (Tijdschr. voor. Ent. 57, 191) and regard one of this 2nd group—*C. caudatus*, Fabr. (1805)—as being so endowed. Like the latter, again, it has “black patches on the back of the mesonotum behind the suture (although, in addition, others, as above described, in front of it). The type locality of Fabricius’ species (*caudatus*) is, however, Java—of whose fruit flies the Dutch dipterologist is writing also, not the Philippines. Again, the description (*vid.* Froggatt, W. W., *l.c.*), that he gives of this fruit fly being brief, and neither an example of *C. caudatus* (Fabr.) Meijere from Java, nor one of *C. caudatus* (Fabr.) Bezzi, from the Philippine Islands, being before us, it would seem hazardous perhaps to identify—as we now do—the Queensland fruit fly with the one from the type locality so named, but such risk may be entertained.

BACTROCERA PULCHER, sp. nov.

Head.—Pale-yellow; occiput almost wholly black nearly to vertex, leaving a yellow continuous post-orbital band; frons yellow, frontal spot large and with short fuscous pubescence, rather broad, length less than half greatest width, slightly widening in front; lunula wide, without central groove, pale hued, face with central area very flat-white, not raised towards mouth-margin, facial black spots non-circular—drawn out anteriorly, antennæ reaching beyond front border, second joint, with numerous black hairs, about twice the length of first and two-thirds length of third joint, third joint brown, fuscous on outer face, arista simple black with yellow basal portion; palps (not observed), cephalic bristles as follows (*Note.*—Dropped out, except postocular and anterior fronto-orbital, that are black), vt., ocp., s.or. 1, i.or. 3: the latter anterior fronto-orbitals three in number, post-occipitals placed in yellow band.

Mesonotum.—Black from anterior border to scutellum, rather coarsely closely punctured, pubescent: a spot on lower side of humeral callus, and a patch from just in front of suture, including supra-alar stripe and wing origin red. Calli and spots present as follows:—Humeral hypo-pleural calli conjoined contiguous to scutellum, supra-alar band very short extending only half-way from suture to hind border; scutellum yellow with two bristles and with a dark basal border; mesophragma black—dull; chætotaxy as follows:—Prescutellars 2, scapulars 4, supra-alar anterior present—black, and otherwise as in *Chætodacus* spp.

Legs.—Coxæ (black), femora and tibiæ red, former with erect, latter with depressed pubescence, tarsi yellow, ungues black.

Wings.—Conspicuously 2 banded with fuscous, veins brown except those included in markings, these being black. Second basal cell elongate, just exceeding second basal cross-vein (hind cross-vein), small cross-vein sigmoid, distance between it and hind cross-vein well exceeding length latter, third and fourth longitudinal veins with evenly curved outer sections; markings, a broad fuscous marginal band filling costal cells, stigma, marginal and outer half of sub-marginal cells to wing-tip: basal cell above second basal cell also fuscous; a broad triangular fuscous patch

from outer wing margin, and wholly including hind cross-vein, to third longitudinal vein and including and passing beyond small cross-vein: and anal stripe including anal cell and anal half of third posterior cell.

Abdomen.—Black coarsely densely punctured—punctures tending to form rugæ; basal portion (joints 1 and 2) with white pubescence, remaining segments pubescence yellow: a conspicuous broad yellow band along hind border of second segment slightly wider laterally then narrowing and extended to sides, pectens of bristles on hind border of segment 3 present. Venter, except a marginal light-coloured band black.

Host.—Not ascertained. The fly observed settled on a fallen orange (Hall).

Habitat.—A single specimen from Glass House Mountain, Southern Queensland, 24 and 24, Col. Dep. Agr. and Stock Reg. D. 1084 [Type].

Note.—This fruit fly in having three inferior fronto-orbital bristles agrees with *C. cucurbitæ* (Coquillet), but the bright-yellow middle stripe beyond the suture of the mesonotum of the latter not noticeable. It may, however, be within the varietal range of that widely distributed species, notwithstanding the highly developed fuscous markings of its wings.

Gen. DACUS.

DACUS CUCUMIS (French), Plate XXI., Fig. 5.

QUEENSLAND CUCUMBER FLY.

Syn. 1907 *Dacus tryoni*, Frogg., var. *cucumis*, French. Journal Dept. Agr., Vict., 1907, May.

Syn. 1909 *Dacus tryoni*, Frogg., var. *cucumis*, Frogg. "General Account of Flies—Trypetidæ," 1909, pp. 12-13.

Syn. 1910 *Dacus cucumis* Fr. "Notes on Fruit Flies (Trypetidæ)," Proc. Lin. Soc., N.S.W., XXXV., 4, p. 886, Nov., 1910.

Syn. 1913 *Dacus cucumis* (French.), Bezzi. "Critical Review of Oriental and Australian Trypancidæ hitherto described (in Indian Trypaneidæ F. Flies), Mem. Mus. Ind. (iii.), p. 70, 1913.

Note.—In no case do these references cover adequate description of the insect.

Male and Female Measurements.—Male, length of body 6 mm., of wing 6 mm.; female with ovipositor 8 mm., ovipositor 1 mm., wing 7 mm.

Head.—Brownish horn-coloured; occiput yellow horn-coloured part bordering eyes behind whitish central area swollen above, frons of almost even width with central area, anteriorly tumid with frontal yellow spot and brown dark spot in-front, lateral spots wanting; lunule compressed to form a narrow ridge; face little prominent in centre anteriorly, spots circular well within oral-margin; cheeks wide beneath

eyes, gules pubescent; antennæ with first and second joints subequal, third scarcely exceeding face, arista long without cilia and basal one-third or more pale; palps yellow not widened apparently terminally curved; proboscis very hairy; cephalic bristles, p.vt. wanting, vt. 4, o.ep. indistinct, weak, and pale, fronto-orbitals, black—s.or 1; i.or. 3 (1 and 2) (as in *D. cucurbitæ*, Coquillet), the latter two close together in front—small and difficult to detect, gular-bristle reddish.

Mesonotum.—Pale reddish-brown with appressed golden pubescence finely rugose punctate præsutural area with two pale longitudinal bands defined laterally and separated by narrow brownish lines, suture narrow about one-third dorsum not involved in it, calli and marks both very pale-yellow to white as follows:—Dorsum with a short mesial callus extending backwards from suture two-thirds distance towards scutellum gradually broadening and rounded terminally, humeral callus well separated from notopleural callus, mesoplural stripe broad, hypopleural double, supra-alar band with upper border almost straight, lower excavated, posterior end rounded and embracing hind supra-alar bristle; scutellum broad, two pair bristles, apical ones black, lateral brown, rather more coarsely punctured than is mesonotum; mesophragma impunctate uniformly brown, bounded laterally by an indistinct yellow band and dark line; thoracic bristles, sep. 4 dark-brown, pr.s. o., hm. o., n.pl. 2, all dark piceous, darker than scapular, m.p. 1 pale-brown, sa. 2 posterior, the anterior wanting* (two or three small bristles at root of wing in front), scutellars 4 dark, fuscous almost black, basal about half-terminal.

Wings.—Rather long, veins yellow, costal vein, first longitudinal and third longitudinal, yellow; costal cells colourless, transparent; costal stripe or border includes paler stigma and involves narrow marginal cell, and wing border evenly of submarginal cell, ending without enlargement or narrowing at wing tip between third and fourth longitudinal; *an indistinct light fuscous band along both sides of the terminal division of fifth longitudinal vein*, beyond hind cross-vein, first basal cell in front of anterior border of second basal cell fuscous; an anal streak occupying anal cell and its narrow extension, that reaches about half-way to wing-border, and also continued with a faint infuscation on the side of the third posterior cell.

Legs.—Uniformly pale-yellow, the femora of lighter hue clothed with tawny pubescence more dense on tibiæ above, end-spur of middle tibiæ short and black.

Abdomen.—Finely punctured surface with golden appressed pubescence, dorsum first or basal segment smooth, yellowish horn colour (sometimes a broad marginal white band along hind border of each of succeeding three segments). Venter pale-coloured, whitish.

* Individual examples rarely possess a weak short anterior sa. bristle—usually occurring on one side mesonotum only.

Male.—Abdomen with hind lateral border of third segment apparently without pecten of vibrissæ. The several segments well defined.

Flesiotypes.—Reg. No. Q.M. D. 3134.

Host.—Cucurbitacæ—i.e., cucumber, pumpkin, vegetable marrow, melon—especially damaging the fruit of these when newly formed (C. N. Collins); also tomato.

Hab.: Bowen, Yeppoon, Howard, Brisbane Qd. (H.T.), Coonamble N.S.W. (Froggatt, 1909-12).

Note 1.—This fruit fly was first named by C. French in 1907 merely as a variety of the so-called “Queensland Fruit Fly” *C. Tryoni*, his brief account being based on specimens reared from Bowen (Queensland) cucumbers received in Melbourne during September of the previous year. W. W. Froggatt adopted this determination in 1909, but in the following year, after having forwarded specimens to both Bezzi and Coquillet, favoured their view and regarded it as a distinct species. M. Bezzi on his part confirmed its specific rank in 1913. In our “Report of the Entomologist, Department of Agriculture, Queensland, 1910-11,” after reference to the existence of this fruit fly at Melbourne, Victoria, in cucumbers from Bowen in October, 1906, as above alluded to, it is further stated:—“The occurrence of this fruit fly in our cucumbers was not confirmed by this office until 26th November, 1910, when the insect had recently been found, in numbers in the same class of vegetables, from Bowen; also by the New South Wales authorities. A few days earlier, however, this office had reported having reared it from tomatoes from the same fruit-growing district.”

Note 2.—It might be considered that *Dacus cucumis* (French) might prove to be a variety of the very variable *C. cucurbitæ*, Coq., a fruit fly also apparently occurring in Queensland. However, it is very different from it, and in fact it exhibits noteworthy features that may be regarded as adequate to place it in a separate genus from that containing *C. cucurbitæ*. *These features comprise two pairs of scutellar, absence of pre-scutellar, absence of anterior supra-alar, and of posterior ocular bristles.* At the same time it possesses, in common with *C. cucurbitæ*, three anterior frontal ones.

Bezzi, writing in 1916 on another fruit fly associated with the fruit of Cucurbitacæ elsewhere, *D. brevistylus*, Bezzi, states: “Amongst other Oriental and Australian (species of) *Dacus sens. str.* are only it and *D. cucumis*, French (1907), from Queensland which has, however, four scutellar bristles, a thing which has never been observed in any Ethiopian species of the genus. (Bull. Ent. Res. vii., 101). Bezzi has described since this utterance three Philippine Island species of *Chetodacus*, each of which has four scutellar bristles, apparently a feature also in a fourth:—(1) *C. mundus*, (2) *C. tetrachætus*, (3) *C. scutellinus*, but of these the No. 1 is said to have three lower orbitals, whilst No. 2 and No. 3 have only two of lower orbitals, but none of them has either the anterior supra-alar or prescutellar bristles absent, and so fails to preserve the characteristic

features of our *C. cucumis*, Fr. (Phillip. Journ. Sc., xv., 5, Nov., 1919). The Queensland insect is, therefore, a somewhat exceptional species of *Dacus*.

DACUS SIGNATIFER, sp. nov.

RAINFORD'S FRUIT FLY.

Measurements—

Female.—Length of body, including ovipositor, 7 to 7.5 mm. Length of wing 6 mm.

Head.—Uniform pale brownish-yellow or horn-colour; occiput without markings, a row of minute setæ on borders of occipital foramen; vertex with ocellar spot distinct, but not traversed by a dark bar; frons slightly narrowing towards face, an orange-yellow spot in centre, reaching backwards to first of anterior fronto-orbital bristles; frontal spots indistinct; lunule crossed with a few little striæ; face ascending slowly—if at all—to border of mouth—a central æquilateral flat area, facial spots distinct rounded and remote from mouth-border; antennæ-joints 1 and 2 paler, former rather shorter than latter; palps light-coloured almost parallel-sided, oblong, not widening distally; cephalic bristles, vt. 2 pairs stout black, pvt. and oc. wanting, s.or apparently obsolete (? fallen out), i.or. 2 short and weak or obsolete, oc.p. absent entirely.

Mesonotum.—Pale reddish-brown with appressed golden pubescence, a greyish fascia on each side of a narrow mesial line; a pale broad white callous bar down centre falling short of both fore (ending about level with humeral calli) and hind borders narrowing gradually anteriorly rounded behind, a supra-alar stripe from suture to posterior supra-alar chæta, not reaching scutellar border, humeral, noto-pleural, meso-pleural, and hypo-pleural pale yellow or whitish calli or bands, mesa-neural united with sterno-pleural below; scutellum yellow with both apical and basal bristles, basal pair very short and difficult to discern; thoracic bristles, sep. 2 pairs black median the shorter, pr.sc. wanting, n.pl. 2, p.sa. 1, a.sa. wanting.

Legs.—Horn-yellow, tarsi paler, the short spinelets at the end of the tarsal joints, and spine at end of third tibia black.

Wings.—Hyaline costal cells colourless, costal band pale fuscous—including stigma marginal cell, outer border of submarginal narrowly to half-way between 5th and 6th longitudinal veins; an oblique anal stripe, occupying anal cell and its extension, and adjacent portion of 3rd posterior cell; male with a supernumerary lobe defined by indenture where anal nerve meets wing border.

Abdomen.—Pale rusty-yellow (pale yellow-brown) with appressed golden pilosity, segments 1 and 2 demarcated with a broad whitish band, contiguous to hind border and occupying posterior half of segment 2; a conspicuous well-defined longitudinal black spot pointed anteriorly in centre of dorsum of segment 5 (in some individuals an isolated black point on each side of it, sometimes reduced and forming ill-defined

blotches); female ovipositor-joint 1 (6th abdominal segment) glossy, joint 2 (7th abdominal) sub-equal when exerted; male with pecten of cilia on each side of hind-border of third segment.

Note.—The possession of 2 pairs of scutellar bristles, and of the meso-notal central vitta associates this species with *D. cucumis*, French. The present insect also lacks the anterior supra-alar bristle and post-orbital bristles in common with this species and *C. jarvisi*, n.sp. The absence of the infuscation at the end of the 5th longitudinal vein distinguishes it, however, from the former, and the colour scheme of the abdomen from both—especially the presence of the black spot implied in the term *signatifer*.

Types.—Reg. No. Q.M. D. 3135. Two females.

Host.—Fruit of *Capparis laurifolia*, R. Br.

Hab.—Bowen, on east coast, bred from the fruit of the local *Capparis laurifolia*—one that is purplish coloured, January, 1915 and 1926. (E. H. Rainford.)

DACUS NIGER, sp. nov. (Pl. xxiv., fig. 14.)

THE SMALL BLACK FRUIT FLY.

Male and Female. Measurements—

Length of body with ovipositor 5 mm., of wing 4 mm.

Head.—Brownish-yellow and black; occiput black except only an even narrow pale-yellow hind-orbital margin; frons pale-yellowish, length rather more than twice width, very slightly widening anteriorly, central spot large brownish, lateral series of 3 spots the same; lunule pale-yellowish, its central area slightly inclined from depression towards fore-border, facial black spots almost contiguous to latter, cheeks linear; antennæ slightly exceeding face and carried away from it, joints 1 and 2 sub-equal brownish, former with very short black spinelets at end—latter with a single larger one, joint 3 reddish exceeding 1 and 2 and outwardly infuscated, arista longer than it simple; mouth-border white; palps broad orange; proboscis brown; cephalic bristles black and as follows:—vt. 4, s.or. 1, i.or. 2—well-developed, gular 3 or 4 short and 1 longer, oc.p. about 7.

Mesonotum.—Wholly black, notum and pleura alike, finely closely punctured and with short greyish-white pubescence, a broad, dark-greyish indistinct uninterrupted bar on each side of the middle line above, comprised of a lancolate portion in front of the suture, and of a club-shaped one behind; the calli, spots, and stripes lemon-yellow and as follows:—humeral callus, noto-pleural, meso-pleural, hypo-pleural all distinct, the sterno-pleural callus and the supra-alar band wanting; the scutellum black and yellow, having a narrow black basal stripe occupying it anteriorly, and in its centre a broad parallel-sided black band

occupying nearly $\frac{1}{3}$ width and attaining laterally the apical bristles, but falling short of the hind-border, each side of it beyond being broadly occupied with yellow; meso-phragma entirely black, this colour on each side merging with that of the hypo-pleural calli; thoracic bristles—all black—as follows:—*Scutellar bristles* 4—both an apical and a lateral pair, the former the longer, sc. 4, the inner the shorter, pr. sc. 2, pl. 1, m.pl. 1, a.sa. 1, p.sa. 2, pt. 1.

Abdomen.—Slightly stalked, sub-rotund, black above and beneath, above with whitish pubescence; on the dorsum of segment 2 and wholly contiguous to its hind-border, 2 white transverse bars, separated at the middle line, convex in front, narrowing and terminating laterally; male apparently without pecten of bristles on hind-border of segment 3 at sides; ovipositor very short; halteres white.

Wings.—Almost without markings, 2nd basal cell length nearly twice width, marginal cell very narrow, 4th longitudinal vein with part beyond hind cross vein unusually arcuate, the extension of anal cell falling short of wing margin by its own length; veins yellowish, especially distally, suffused with fuscous; costal, 1st longitudinal and 3rd longitudinal veins with the usual black bristles; costal band almost obsolete, costal cells hyaline and colourless, stigma very pale fuscous; *marginal cell with fuscous hue just traceable*; narrow portion of 1st basal cell and anal cell colourless, *no anal band*.

Legs.—Femora and tibiae of 1st pair horn-yellow, former with numerous erect black hairs throughout their extent—those of the under surface the longer; tarsi pale-brown with short black bristles and 3 longer inter-ungual ones, middle legs with trochanters black, femora horn-yellow, tibiae infuscated with brown, and with terminal bristle black, tarsi whitish, 2 short black spines at the end of 2nd tarsal joint, others with shorter similar ones; hind legs with coxa, the end of femur broadly, and tibia black, tarsi whitish and with short black spines.

Type.—Reg. No. Q.M. D. 3136. Holo- Allo- and 1 Paratype.

Host.—The fruit of the indigenous tree, *Symplocos Thwaitesi*, F. v. M. Fam. Styracæ (Gympie District).

Hab.—Cleveland, Southern Queensland, a single specimen, April, 1894, found in a fruit fly lure (S. Wort); Gympie District as above (C. F. Evans).

This small black Trypetid fly with almost plain (unmarked) wings is very unlike the commoner species of Australian fruit flies. Examination, however, fails to discover any features denotive of a genus generally distinct from *Chatodacus*. Its small size associates it with the lesser of the species of *Dacus sens. strict.*

Gen. **CERATITIS**, Macleay (1829).

CERATITIS CAPITATA, Weidemann.

Plate XXII., Fig. 8.

MEDITERRANEAN FRUIT FLY (AFRICAN FRUIT FLY).

Syn. Trypeta capitata, Wiedemann, C. R., 1824.

Syn. Ceratitis citriperda, Macleay, W. S., 1829.

Syn. Petalophora capitata, Macquart, J., 1835.

Syn. Ceratitis capitata (Wied.), *var. hispanica*, Breme, F. D., 1842.

Syn. Ceratitis capitata, Guerin-Meneville, F. E., 1843.

Syn. Petalophora hispanica, Rondani, 1870.

Syn. Halterophora hispanica, Penzig, 1887.

Syn. Halterophora capitata, Tryon, H., 1897.

Syn. Orange Fruit Fly (Mosca del arance), Martellig, 1910 (*vid. Froggatt*).

Syn. "Mediterranean Fruit Fly," Lea, A. M., 1899.

The binomials in each case were used by other writers subsequent to the dates named.

When in March, 1897, Tryon published his identification of a fruit fly that had then recently appeared in Western Australia as the species under consideration, he gave a bibliography relating to it (*vid. Journal, Bureau of Agriculture, W.A., March, 1897, p. 1186*). Subsequent to this bibliographies relating to fruit flies generally have considerably augmented the list.

Thus F. Silvestri (Territory of Hawaii Divis. Entom. Bul. 3 Honolulu 1914), in his "Report of an Expedition to Africa in search of Natural Enemies of Fruit Flies," and under the heading "Bibliography" (*Op. cit.*, pp. 131-146), specifies upwards of fifty-four brochures relating to this insect as is generally indicated by their titles. The same bulletin also gives an extended account of *Ceratitis capitata* (Wiedm.), the fullest in fact that has appeared (*Op. cit.*, pp. 42-61, pl. 1). W. Froggatt writing in 1899 ("Notes on Fruit Maggot Flies," *Ag. Gaz., N.S.W., x., 500*) succinctly described this fly also. Again, W. B. Gurney has fully treated of the insect from the standpoint of the economic Entomologist (*vid. "The Common Mediterranean Fruit Fly, Ceratitis capitata," Agr. Gaz., N.S.W., 1910, pp. 30-33, and 1912, pp. 11-15, pl. ii.*), and more recently still E. A. Back and C. E. Pemberton have issued two important papers concerning this fruit fly (*vid. Journ. Agr., Res. III., No. 4, pp. 311-330, and No. 5, pp. 363-374, 1915*).

Queensland Habitat (?).—The former Government Entomologist, New South Wales, states:—"For a long time it was believed that it (*Ceratitis capitata*, Wied.), was not to be found in Queensland and,

although from what I can learn it is not common, yet it is found in Queensland fruit, and I have specimens from Brisbane." (Froggatt, W. W., Report, 1908-9, p. 104, 1909.)

C. French, in the same year, 1909, in which Froggatt's testimony appeared, wrote:—"No less than sixty adult specimens have been reared from two specimens of the bitter or seville orange which have been sent (to Melbourne) from one of the northern parts of Queensland." Handb. Des. Ins. Vict. IV., s.v. Mediterranean Fruit Fly, *Halterophora capitata* (p. 35).

However, Mr. Froggatt's statement is quite consistent with the origin of the specimens in both the cases of its occurrence referred to by him, finding an explanation in the fact that not infrequently during the season when fruit is received here from Sydney, it harbours *Ceratitidis capitata* fruit fly maggots, a remark that is especially true of oranges, and hence adult flies can be secured in numbers (on rearing the maggots to maturity), and so virtually may come from Brisbane without being actually endemic there.

This would, too, apply to C. French's observation if well founded; but in the same publication cited, in which it is made, we are informed "The seville oranges were from Sydney" (French, C., *op. cit.*, p. 32). The Mediterranean Fruit Fly infested bananas and oranges, arriving at Melbourne from Queensland, as alleged, on 14th August and 19th September, 1909, may be similarly accounted for.

Personally we have never seen an example of this so-called "Mediterranean Fruit Fly" in Queensland, either at large or as resulting from rearing the adult from fruit fly maggots, or as having been captured by any one of the fruit fly lures used, even kerosene. And this we note as a remarkable fact, seeing how often, as above stated, fruit of New South Wales (oranges) has in the past arrived here harbouring *Ceratitidis capitata* maggots, and fruit trees to serve as hosts are growing in the near vicinity of the port. A *Diseases in Plants Act* was, however, included in Queensland's statutes in 1896, under which a commencement was made to deal with any such imported maggot-infested fruit in a summary manner. Moreover, the excellent figure of *Ceratitidis capitata* that illustrates more than one publication by W. W. Froggatt on fruit flies so well portrays the insect that it has been adopted by not only the New South Wales Entomologist himself repeatedly, but by others elsewhere, and notably by F. Silvestri in his work referred to. And this being so, and much accessible literature relating to this fruit fly being available, it is not necessary to burden the text with descriptive details. The key to our fruit fly species (p. 180) and figure (Plate xxii.) should suffice for the identification of *C. capitata*, W.W., even in their absence.

Host Plants.—These are exceedingly numerous as well as varied, and include almost all the economic plants mentioned under this heading (Host Plants)—in treating of *Chaetodacus Tryoni*, Frogg. (pp. 184-185).

Silvestri, indeed (*op. cit.*, pp. 45-47), gives a list of fifty-two plants whose fruit *C. capitata* will attack. And W. B. Gurney, dealing with New South Wales only, mentions oranges, mandarins, cumquots, seville oranges, persimmons, peaches, apricots, nectarines, guavas, and occasionally other cultivated fruits, including passion fruit, and exceptionally *Maclura* and *Opuntia* as possible hosts. No record has been seen of the so-called Mediterranean Fruit Fly having been met with infesting any native Australian fruits.

Habitat.—F. Silvestri, after full personal inquiry, states as follows:—“The natural habitat of *Ceratitis capitata* is certainly tropical Africa, south of 8 degrees north latitude” (Silvestri, 1914, p. 45). Wiedemann’s type locality for the species—the East Indies—assigned to it in 1924 is, in fact, certainly an error, since the insect has never been reported as occurring there during the 100 years since he wrote. Its range of distribution is, however, now world-wide, including not only North, West, South, and South-east Africa, Madeira, and the Azores, but also the Mediterranean region (Spain, Italy, Malta, in addition to Algeria), the West Indies (Bermuda), Eastern South America, Hawaiian Islands, and lastly Australia.

Note.—A résumé covering these facts, accompanied by interesting personal observations, is given by W. W. Froggatt in his “Report on Parasitic and Injurious Insects” (1907-8, Syd., 1909, Part III. “Fruit Flies,” pp. 100-105.

Occurrence in Australia.—This fruit fly, whose habitat has already gained a world-wide extension beyond its original home, arrived in Australia many years since, but when it first reached there and by what agency are not matters than can be now ascertained. The first recorded instance of its occurrence in Australia was in October-November, 1896, when it was found “infesting limes and afterwards apricots, peaches, nectarines, and figs” at Guildford, near Perth, Western Australia (C. Fuller). The insect found there was later identified by H. Tryon as *Ceratitis capitata*, Wied. (Halterophora). (C. Fuller and H. Tryon, Journ. Bureau Agr., W.A., 1897.)

Then early in 1898 it was reported as being present in New South Wales, peaches received in Victoria from Sydney being found to be infested by it (C. French). This discovery was at once confirmed by W. W. Froggatt, when maggots, in New South Wales peaches also, “supposed to be infested with the Queensland fruit fly,” proved to be those exclusively of this insect (Froggatt, W. W., “Notes on Fruit Flies,” Ag. Gaz., N.S.W., x. 6, p. 9, 1899). He further writes with reference to the fruit season 1898-9:—“All the specimens bred in this office from fruit from anywhere south of Newcastle have been the Mediterranean fruit fly, *Halterophora capitata*, Weid.” . . . “Fruit containing maggots have come from all quarters around Sydney.” (Froggatt, W. W., Rep., 1898-9, 1909, p. 98.)

This extended occurrence in New South Wales was not suggestive of a very recent introduction then. Nearly ten years later, in 1906 or 1907, we find that *Ceratitidis* is established in certain parts of Victoria, in the Doncaster district especially; but whereas in both New South Wales and Western Australia the insect became wider disseminated following its discovery, in Victoria, on the other hand, when two seasons had elapsed since the outbreak there of the Mediterranean Fruit Fly, entire absence of the pest was reported (G. Quinn, Journ. Agr. of S. A., 1909, p. 90). However, early in 1924, a new instance of its occurrence in Victoria was revealed, the incident being that of the "Mildura Manifestation."

RIOXA, Walker.

RIOXA MUSÆ, Froggatt-Bezzi.

*ISLAND FRUIT FLY, SPOTTED FRUIT FLY, BOATMAN.

Froggatt, W. W., Agr. Gaz., N.S.W., 1889, and Reprint Misc. Pub. Dept. Agr., N.S.W., No. 303, 1889, *Trypeta musæ*.

Froggatt, W. W., Rep. Parasitic and Injurious Insects, 1907-8, Pt. III., pp. 113-114, pl. vii, *ib*.

Tryon, H., Reports *passim*, "Spotted Fruit Fly."

Tryon, H., Annual Report of Entomologists, 1904-5, p. 71 (*Tephritis psidii*), Gurney, Agr. Gaz., N.S.W., 1912 (*Dacus musæ* (Frog., Gurney)).

Male and Female Measurements.—Length, body and ovipositor 6 mm., of wing 5 mm., ovipositor proper scarcely exerted, its sheath (abdominal joint 7) 1 mm.

Head.—Yellow, acquiring a brownish hue on drying (white in life); occiput without markings, ocellar spot simple; frons almost parallel-sided, face with usual *Rioxa* characteristics, antennæ with joints one and two subequal, three not greatly exceeding them; first joint with minute black spinelets terminally, second with a patch of same on inner surface and as short-black bristle in outer side of fine border, arista with a row of hairs on both upper and lower surfaces; palps pedunculate pyriform white with several black terminal hairs; proboscis white with yellowish hairs, cephalic bristles complete including p. vt. 2, oc. 2, orb. 2, 2, and ocp. well developed about 15, gular bristle present and with row of spinelets following orbital margin in both sides.

Mesonotum.—Uniformly pale-yellow, pleura and sterna lighter, whitish, with minute brownish appressed discrete pubescence, mesopleuron hairy in front, the thoracic chaetotaxy complete, including

* W. B. Gurney (Agr. Gaz. N.S.W., xxi. 5, p. 428, 1910) throws doubt on its extra-Australian occurrence (implied in this designation), writing as follows:—"Island Fruit Fly (*Trypeta musæ*) ranges from Bulli, N.S.W., northwards to Queensland, described by W. W. Froggatt from specimens said to be from New Hebrides; hence the name; but it is possible (? probable) the locality of origin was Queensland."

amongst other bristles h., pr.s., dc. 2, a.sa. 1, m.pl. 2, s. subequal short, scut. 3.3—the intermediate of the three scutellar pairs much weaker than the others; pectus between legs of both second and third pairs clothed with short brown bristles; post-scutellum yellowish nitid.

Abdomen.—Above almost black with basal portion white and venter also white; segment 1 white with pubescence of minute black hairs at sides, 2 white, 3 white with fuscous lateral patch, 4 fuscous except narrow lunate white fore-border, 5 fuscous, 6 fuscous nitid, 7 (ovipositor sheath) elongate triangular with a narrow mesial ridge fuscous tipped with white, segments 2 and 5 partly, and 3 and 4 wholly, clothed with small black appressed pubescence, segment 7 with denser and finer pellory, segments 2 to 6 with the hind border ciliated with black bristles and similar ones occurring on their sides; beneath, abdominal mesial sclerites 2 to 4 oblong pale-fuliginous, 5 to 6 yellowish, latter apparently minutely shagrened, all minutely pubescent; the anterior 3 also each with a short black bristle.

Wings.—Pattern arrangement with hyaline colourless—or faintly whitish—portion almost predominating as in *R. Dunlopi*, and disposed as follows:—Costal cell entirely without band defining small cross vein, the stigma being black, a single triangular indentation beyond costal cells with its apex just exceeding 2nd longitudinal vein, two discal circular spots—one near end of 1st basal cell, and one in 1st posterior cell; 2nd posterior cell, too, almost wholly hyaline—except for extension from 1st posterior and band defining hind cross-vein, and uninterrupted hyaline along margin from 5th to base, the colourless area extending into and almost occupying discoidal and 3rd posterior cells, and entire base of wing excluding the foregoing colourless portions of the wing fuscous; venation:—1st longitudinal short ending about level with small cross-vein, costal bristle at end of auxiliary present, posterior cross-vein not bristly, and anal cell with inferior angle short broad and pointed—little-developed, thus.

Legs.—Unspotted; front coxæ with 4 black bristles on front side towards end, intermediate coxæ and coxæ of third pair, with 3 outer and 2 posterior ones; femora of 1st pair with long row of black bristles above and row at sides, and short linear series below, intermediate femora with short black hairs beneath, 3rd femora with 4 black bristles at end.

Note.—In a variety of this fruit fly, from the fruit of *Villaresia Moorei*, F. v. M. (Olacineæ) the following features are present:—In male, on femora of 1st pair legs occur 3 rows of erect long black hairs, two on the outer and one on the inner surfaces, the femora of the 3rd pair have again 2 rows of non-erect black bristles in the under surface. In the female the front femoræ are similarly endowed, and in the 3rd pair the decumbent black bristles towards the end of joint are longer than the others. In both sexes all the tibiæ exhibit a pilosity of minute decumbent black hairs and the tibiæ of the front pair are otherwise bare, but the tibiæ of the 2nd pair in both sexes have the stout terminal black bristle, and in the male a short erect black bristle on inter surface at two-thirds

of its length; the tibiæ of the 3rd pair of legs have rows of black bristles in the male one of about 9, and in the female on the outer surface one of about 12 and a shorter one of 3.

Plesiotypes.—Reg. No. Q.M. D. 3137; two examples.

Host.—We have reared *Rioxa musæ* (Frogg.) from fruits of the following indigenous trees:—Meliaceæ, *Owenia venosa*, F. v. M. ("Crow's Apple"); Sapotaceæ, *Sideroxylon laurifolium*, F. v. M., *Sideroxylon myrsinoides*, A. Cunn; and Gurney, New South Wales, reports having reared it from the "Black Apple," *S. australe*.

A number of cultivated fruits are also subject to infestation by its maggots:—Citrus fruits—especially mandarins, apples, quinces, pears, &c.—also ripe bananas.

Note.—It would appear that its usual habit is to attack fruit already quite mature, or even in process of decay, or such as has acquired some skin blemish or injury; accordingly its presence is not regarded as fraught with serious significance. W. B. Gurney, Government Entomologist, N.S.W., has arrived at the same conclusion also. It is one of the flies attracted by bodies containing metheugenol, *e.g.*, citronella oil and Huon Pine oil.

Hab.—Probably throughout coastal Queensland, since we have established its occurrence in places situate from Rockhampton southwards to the border, and as far west as Stanthorpe. In New South Wales it occurs at spots along the coast to as far as Thirroul, situated to the south of Sydney (W.W.F.). In Froggatt's original account (1909, pp. 113-114) this fly *Rioxa musæ* is not only termed the "Island Fruit Fly" and to have come from the New Hebrides, but we are informed that, "Within the last few years this species has been introduced into Queensland." (Both statements are open to question. H.T.)

Note.—This fruit fly has long been recognised as frequenting fruit trees of one kind or another, being often quite prevalent in citrus orchards, and popularly has been referred to as the "Boatman," in allusion to its habit of slowly moving its wings paddle-fashion, and again as the "Spotted Fruit Fly." However, it was not described until 1899 when W. W. Froggatt named it *Trypeta musæ* n.sp. from specimens reared from maggot-infested bananas said to emanate from New Hebrides. In assigning it then to *Trypeta* he was persuaded, at the time, that the fly belonged to the same genus as the well known Apple Maggot Fly—*Trypeta pomonella* of U.S.A. (*vid.* Agr. Gaz. N.S. Wales, 1899, p. 501, Pl. II., figs 1 and 2). Again in 1910 he treated of it under the name—the "Island Fruit Fly"—*Trypeta musæ* (Report 1907-8, p. 113-114, Pl. VII., figs. 1, 2, and 3a).

Further, under *Trypeta musæ*, he in 1910 gave an account of it (*vid.* Proc. Lin. Soc., N.S.W., XXXV., Py. 4, p. 372, 1910). However, since Froggatt in his earlier paper described figures 1 and 2, on the plate that illustrated the insert, "*Tephritis psidii*, Froggatt," this name was applied to *Rioxa musæ* in H. Tryon's Annual Reports of Entomologist,

Depart. Agr. Qd.," for both 1904-5 and 1906-7, Gurney in a paper on "The Island Fruit Fly, *Dacus muse*," 1912, gave an interesting account of the life history of the species, and he, moreover, not only altered its generic designation from *Trypeta* to *Dacus*, but threw doubt on the type individual ever having originated in the New Hebrides, stating, "Possible locality of origin is Queensland."

RIOXA ARAUCARLÆ, sp. nov.

(Plate XXIV., Fig. 12.)

ARAUCARIA SPOTTED FRUIT FLY (*Tryon*).

Male and Female. Measurements:—

Male.—Length 7 mm., length of wing, 6.5 mm. *Female*.—Length of body 7.5 mm., wing 5 mm.

Head.—Pale brownish-yellow; occiput brownish-orange above hoary whitish lower sides and beneath, a row of five minute black bristles from foramen on each side towards outer of vertical bristles; vertex coloured as frons, no markings; frons brownish-yellow, a small patch of blackish pilosity in centre below, a dark infuscation below eye and lower front-orbital bristle, as broad as long scarcely narrowing anteriorly, upper half flat, lower half lowly convex; lunule back; face and epistome dark-brown, non-concave, flat with a mesial longitudinal ridge, antennal furrows reaching epistome, a wide darkish-hued groove continuous with antennal one along lower border of eye to occiput, separate from latter by a narrow whitish line; epistome distinct from mouth-border, con-colourous with face; palpi, light coloured, proboscis dark, both bristly, former fringed with hairs; antenna, 2 basal joints whitish about equal in length, joint 2 swollen at end covered with small short black setæ, joint 3 very short about equal 1 and 2, lower border evenly convex end rounded arista with 2 rows of black hairs (plumose on its 2 sides); cephalic bristles as follows:—Chætotaxy complete as in typical *Rioxa* spp. (p.vt., vt., oc., or., ocp.); orbitals 2 upper anterior one longer, 2 lower anterior very small, these included in a row of nine additional short weak spinelets, oc.p. a row of 8, a row of minute bristles along mouth border following lower orbital border, or which hinder longer; all bristles and spinelets black.

Mesonotum.—Conspicuously white and black longitudinally striped, sparsely clothed with short dark pubescence; in detail—a dark mesial stripe, narrowed and linear in front of suture, widening behind from fore to hind border and continued narrowing to a point to apex of scutellum; a noto-pleural band from hinder supra-alar bristle contiguous to upper side of humeral callus, but not reaching anterior border; a mesopleural band contiguous to lower side of this callus, extending also hindwards beneath wing below infra-alar seta to mesophragma; a broad dark fuscous band on side of pleuro-sternum united with its fellow in front; interspaces whitish; scutellum broadly triangular above with usual

3 pairs of bristles of which the middle (lateral) pair are shorter than others, surface broadly whitish on each side, this colour passing to its under-surface; mesophragma black, whitish in front nitid—sloping backwards; thoracic bristles—chaetotaxy complete, including in addition to those of the Dacine fruit flies h., pr. st., de., all black and long, the anterior supra-alar and presutural especially so; a row of bristles crossing pectus behind, and meso-sterna in front of mid pair of legs.

Abdomen.—Above black nitid, *white banded* with short black pubescence and a continuous lateral band of black hairs and long terminal black bristles on last segment; first, second, third, and fourth segments with each a transverse white band wide in centre and narrowed laterally—along hind border under surface with a well-defined reddish patch at base.

Note.—In a male individual a white spot in the centre of fifth segment above is noted, and bristly hind borders of segments; sixth segment above glossy, hairy, venter white at base.

Wing.—Elongated, first longitudinal vein meeting costal border much nearer end of auxiliary than of second longitudinal; well before small cross vein; second longitudinal straight (not wavy); third curved towards hind border; small cross vein beyond middle of discoidal cell; second basal cell elongated, nearly four times greatest breadth, narrowing internally; anal cell with inferior angle drawing to a point much longer than anterior angle and much longer than second basal; a costal bristle present; general colour of wing brown fuscus, stigma wholly of darker hue; the hyaline patches and markings as follows:—One triangular incisure immediately beyond stigma with apex attaining third longitudinal, costal cell except on outer side of cross vein: a round spot filling first basal towards outer end: two bars in first posterior cell—one crossing it beyond the middle, and one large oblique one beyond it reaching wing margin in front of fifth longitudinal vein; a band crossing discoidal cell, parallel to hind cross vein: a broad triangular patch from wing margin to second posterior extending to fourth and fifth posterior cells respectively; central area of second basal and of anal cells and third and fourth posterior cells wholly white also.

Legs.—With minute black pubescence, front ones stoutest; coxæ almost black; femora wholly infuscated; tibiæ short arcuate, brownish horn-coloured; femora with densely-planted long black setæ, especially on under surface where they form a brush; middle and hind legs, including coxæ pale-brownish horn colour, seta at end of middle tibia and short setæ at the end of each tarsal joint, black.

Types.—Reg. No. Q.M. D. 3138; Holo- Allo- and 1 Paratype.

Loc.—Macpherson Range, South Queensland (Tryon).

Host.—Not known, all the individuals, including both sexes, observed captured on being attracted by fresh resin of *Araucaria Cunninghamii* (Coniferae) H.T.

Note.—The colour-pattern of thorax, and that of abdomen, *inter alia*, distinguish it from the known species of Queensland Rioxæ, including those herein described.

RIOXA JARVISI sp. nov. (Pl. XXIV., Fig. 13).

JARVIS SPOTTED FRUIT FLY.

Female Measurements.—Head with thorax 5 mm. (abdomen in specimen bent under), wing 8 mm. long.

Head.—Yellowish, with only small ocellar spot black, occiput uniformly coloured; frons rather shorter than twice width, slightly convexly widened in middle, longitudinally tumid; face with the central area prominently raised along middle, and deeply excavate anteriorly by oral cavity, antennal grooves extending well beyond antennæ, cheeks narrow gules wide especially beneath eyes; antennæ joints one and two subequal short tumid, joint three short about equal one and two, not reaching front border fuscous, arista black basally brown shortly pectinate on both sides; cephalic chaetotaxy as follows:—Vt. three pairs—two short behind ocelli, one on each side of these two, but rather anterior—shorter still, and one on each side—level with former of last—longer, ocp. about 7, s.or. 2, i.o.r. (dropped out) at least once, oc. 2 small, gular bristle present, and a row of about six unequal ones on gular margin of mouth cavity, all these bristles black; also numerous very short black hairs on frons.

Mesonotum.—Brownish-yellow above and below without markings, above with a greyish coating, and numerous black appressed hairs, these occurring more sparsely beneath, scutellum tumid nitid black at sides, with a central area narrowing from front border backwards yellow; mesophragma black nitid; thoracic chaetotaxy as follows:—hm. n.pl. 2, m.pl. 1 (also 3 shorter), a.sa. 1, p.sa. 2, i.a. 1, st. 1, prsc. 2, all these bristles black; scutellar bristles three pairs, the terminal and intermediate (lateral) ones subequal; a row of about six very short erect pale hairs in front of scutellum.

Abdomen.—Ovate broad black with whitish transverse bands and having minute blackish pubescence with the hairs at the sides of segments 3 and 4 longer, but the hind-margins of segments 2, 3, and 4 glabrous; the whitish bands—narrowly pale-brown anteriorly—broadly bounding segments 1, 2, and 3 behind.

In a second example the undersurface with first and second segments alone whitish.

Wings.—Dark fuscous black hyaline at base, with clear or white pattern as follows:—A triangular spot forming a single indenture beyond the first longitudinal vein with apex extending to third longitudinal one, an oblong spot crossing first posterior cell (that may be continuous with one in second posterior cell), a row of spots at outward end of first basal cell and also a bar—of two spots merged—at base of latter, a large broad

triangular blotch in the second posterior cell arising broadly from the wing margin, and—whilst contiguous to the fourth longitudinal vein—reaching inner anterior angle, two discoidal spots, the external portion of discoidal cell, one circular near outer angle, one continued through fifth longitudinal vein, coalescing with the third posterior cell's white portion; hyaline basal portion of wing with the following parts black—the end of the subcostal cell and a band including humeral cross-vein, and a spot in second basal cell; the sub-costal cell, except outwardly, auxiliary cell, and almost entire third posterior cell, except extension from fifth longitudinal vein, thus white, stigma, and costal bristle, if present, black.

Legs.—First pair much shorter and also stouter than either second or third ones, all yellow with very short fine fulvous pubescence, denser on tarsi; femora of one with numerous conspicuous black bristles on outer face, with a series of four longer ones (bristles) of same colour towards end on lower border of this; middle femora with a band of short black hairs on outer face below, and with three black bristles towards end on inner side; the tibiae of this pair with four longer and four shorter black bristles on border and the usual two long black bristles at end. Hind legs with scattered short black bristles, the tibiae slightly swollen beyond base, and with a few weak dark bristles along upper border.

Type.—Reg. No. Q.M. D. 3139; holotype (female).

Loc.—Stanthorpe (H. Jarvis) and Warwick (H.T.) *host plant* unknown. In both localities captured at large; in the latter met with beneath an apricot tree in fruit.

Described from a single specimen captured at Stanthorpe in 1896 by H. Jarvis, local Entomologist, Department of Agriculture, Queensland.

Note.—The figure, Pl. xxiv., fig. 13, is that of a specimen (locality Stanthorpe, and of similar history) manifesting varietal features. This not available when compiling foregoing description.

OTHER QUEENSLAND RIOXA SPECIES.

The writer has received examples of still three other species of Queensland members of the genus *Rioxa* since this paper was written.

OTHER AUSTRALIAN SPECIES OR RIOXA.

(1) *Rioxa bicolor*, Macquart, *Urophora bicolor*, Macquart, Mem. Soc. Lille 144 (124) 17, pl. 7, fig. 7, 1885. *Trypeta bicolor* (Macq.) Froggatt, W.W., Austr. Ins. 1908, p. 308; *ib.*, Report 1907-8, p. 114. *Rioxa bicolor* (Macq.) Bezzi, Bull. Ent. Res. (x) (1919), pp. 4-5.

Host.—Undetermined. *Loc.*—(a) Adelaide (type locality); (b) New South Wales, Bathurst district, collected on the wing (W. W. Froggatt).

Note.—Froggatt remarks in describing *Roxia musæ* Frogg. and in comparing *R. bicolor* Macq. with it, that the former is “a much lighter coloured fly, with the wings more lightly clouded.”

(2) *Rioxa termitoxena*, Bezzi (1919), Bull. Entom. Res. (x) (1919), pp. 1-5, plate xxiii., fig. 11.

Note.—Bezzi (*l.c.*) states that this differs from *R. musæ* (Frogg.), *inter alia*, in having on the mesonotum in front of the scutellum two black spots.

Host.—Occurs in the termitaria of white ants (Hill).

Hab.—Northern Territory.

This insect of such remarkable associations—as indicated above—is referred to here as well as illustrated to promote success in search for it in Queensland, and so lead to the further elucidation of its remarkable habits brought to light by Hill.

H.T., 1st July, 1926.
